Service Training Manual

BEDFORD

GM

Bedford Trucks & Coaches

Brakes

TS1087

SERVICE TRAINING MANUALS FOR 1973 BEDFORD TRUCKS AND COACHES CONSIST OF THE FOLLOWING:

Title	Ref No.
GASOLINE & DIESEL ENGINES	TS1084
TRANSMISSION & REAR AXLE	TS1085
FRONT AXLE, SUSPENSION & WHEELS, STEERING, CAB	TS1086
BRAKES	TS1087
ELECTRICAL EQUIPMENT & INSTRUMENTS	TS1088
ALTERNATOR CHARGING SYSTEMS	TS951

The manuals listed above can be obtained through Vauxhall and Bedford authorised dealers, or direct from the Service Department, Route 3329, Vauxhall Motors Ltd, Luton LU2 OSY, England.

IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all motor vehicles. The service procedures recommended by Vauxhall Motors Ltd, and described in this manual are effective methods for performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.

It is important to note that some warnings against the use of specific service methods that can damage the vehicle or render it unsafe are stated in this manual. It is also important to understand these warnings are not exhaustive. Vauxhall Motors Ltd could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Vauxhall Motors Ltd has not undertaken any such broad evaluation. Accordingly, anyone who uses a service procedure or tool which is not recommended by Vauxhall Motors Ltd must first satisfy himself thoroughly that neither his safety nor vehicle safety will be jeopardized by the service method he selects.

BEDFORD
Service Training Manual

BRAKES
Bedford Trucks & Coaches

SERVICE

VAUXHALL MOTORS LTD LUTON ENGLAND

CONTENTS

INTRODUCTION

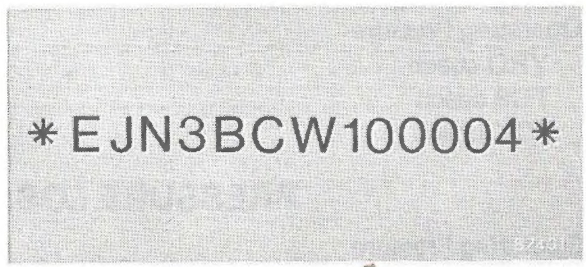
This manual provides the experienced serviceman with information on the special features of the brakes used on 1973 Bedford trucks and coaches, except Series M 4 x 4 trucks, which are covered by a separate publication (TS 1017).

The section headings throughout the manual are numbered consecutively so that cross reference can be made between chapters, thus avoiding duplication of similar information.

The contents list on page 4 includes model designations against the appropriate chapter heading. This list should be used to identify the braking system of the vehicle being serviced.

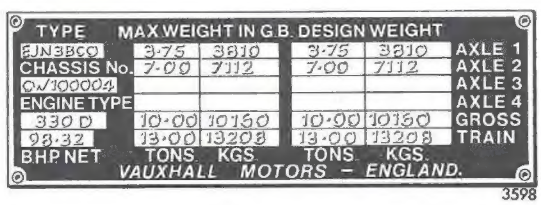
VEHICLE IDENTIFICATION

The model designation and chassis number is stamped on the chassis frame left-hand sidemember, adjacent to the rear spring hanger.



A service parts identification plate is attached to the left-hand seat support. This plate bears the following information in the sequence shown:
Model and Chassis No. Destination Job No.
Paint Code Trim Code
Option Codes
Special Conversion Order No. (as applicable)
Special Vehicle Order No. (as applicable)

On domestic vehicles, a weight specification plate is riveted to the cab floor panel, adjacent to the left-hand seat support.



RITEWAY SERVICE TOOLS

Reference is made in the Manual to Riteway Tools designed to facilitate service operations. Enquiries and orders for these tools should be addressed to Kent-Moore Ltd, 19-21 Stockfield Rd, Acocks Green, Birmingham, B27 6AJ, England.

SUPPLEMENTARY INFORMATION

The information given in this manual is correct at the time of preparation but Vauxhall Motors Ltd reserves the right to introduce specification changes which may affect this information.

To keep the manual up to date with design changes which affect servicing procedure or specification data, supplements are issued from time to time.

SPECIFICATIONS

BRAKE DRUMS

Maximum Permissible Run-out of Braking Surface —	
Checked with drums on hubs	0.010 in.

SAFETY VALVE

Pressure Setting	
ERV, HRX and YRT	9.6 — 10.3 bar (140 — 150 lb/sq in.)
Other models	9 — 11 bar (130 — 160 lb/sq in.)

LOW PRESSURE WARNING SWITCH

Operating Pressure	
YRQ coach	4.5 — 5.2 bar (65 — 75 lb/sq in.)
TOP coach	2.8 — 4.1 bar (40 — 60 lb/sq in.)
POK coach	3.8 — 4.5 bar (55 — 65 lb/sq in.)

PRESSURE LOSS LIMITING VALVE

Operating Pressure	
EJQ8 and EPR8 tractors	4.8 bar (70 lb/sq in.)
YRT coach	5.5 bar (80 lb/sq in.)

COMPRESSOR GOVERNOR VALVE

Cut-out Pressure	
C trucks and TOP coach	7.1 — 7.4 bar (103 — 107 lb/sq in.)
Other models	8.1 — 8.4 bar (118 — 122 lb/sq in.)
Cut-in Pressure	
C trucks and TOP coach	6.1 — 6.4 bar (89 — 93 lb/sq in.)
Other models	7 — 7.3 bar (102 — 106 lb/sq in.)

LOW VACUUM WARNING SWITCH

Operating Vacuum	10 — 16 in. Hg

SC6 COMPRESSOR

Drive Belt Tension — 214 cu in. gasoline engine	0.50 in. deflection under thumb pressure applied midway between compressor and crankshaft pulleys
Piston Rings	
Ring gap in cylinder bore	0.002/0.006 in.
Clearance in piston groove	0.0005/0.0025 in.
Piston	
Clearance in cylinder bore	0.002/0.003 in.
Piston Pin	
Clearance in connecting rod bush	0.0015 in.
Fit in piston bosses	Finger push fit
Crankshaft Rear Main Bearing	
Clearance on crankshaft	0.00055/0.0018 in.
Bush bore diameter	0.99975/1.0005 in.
Connecting Rod	
Bearing clearance on crankshaft	0.001/0.003 in.
Crankshaft	
Crankpin diameter	0.8735/0.8740 in.
Main journal diameter	0.9987/0.9992 in.

SC9 COMPRESSOR

Piston Rings	
Ring gap in cylinder bore:	
Compression ring	0.009/0.014 in.
Scraper ring	0.010/0.015 in.
Clearance in piston groove:	
Compression ring	0.0006/0.0026 in.
Scraper ring	0.0005/0.0025 in.
Piston	
Clearance in cylinder bore	0.0075/0.0090 in.
Piston Pin	
Clearance in connecting rod bush	0.0002/0.0006 in.
Fit in piston bosses	Finger push fit
Crankshaft Main Bearings	
Clearance on crankshaft	0.00075/0.00225 in.
Bush bore diameter	1.49975/1.50075 in.
Connecting Rod	
Bearing clearance on crankshaft	0.0005/0.0020 in.
Crankshaft	
Crankpin diameter	1.2490/1.2495 in.
Main journal diameter	1.4985/1.4990 in.

EXHAUSTER

Rotor Sealing Plate	
Outside diameter	4.5580/4.5595 in.
Thickness	0.250/0.260 in.
Spring ring gap in body	0.011/0.019 in.
Clearance in exhauster body	0.001/0.0065 in.

TORQUE WRENCH DATA

Lockheed Rear Brake Shoe Steady Nuts	17 lb ft
Lockheed Rear Brake Cylinder to Expander Bolt Nuts	35 lb ft
Compressor Cylinder Head Nuts	15 lb ft
Compressor Connecting Rod Bolts	
SC6 compressor	4 lb ft
SC9 compressor	10 lb ft
Master Cylinder Actuator Body Bolt Nuts	18 lb ft
Clayton Dewandre Spring Brake Actuator Cylinder Bolts	10 lb ft
Westinghouse Front and Rear Actuator Clamp Bolts	12 lb ft
Westinghouse Rear Actuator Release Bolt	35 lb ft
Lock Body and Lever Housing to Lock Actuator Body Nuts and Bolts	19 lb ft
Lever Lock Actuator Piston End Body Bolts	10 lb ft
Hydraulic Load Sensing Valve Pivot Bolt	18 lb ft
Hydraulic Load Sensing Valve End Plug	38 lb ft
Hydraulic Load Sensing Valve Mounting Bolts	10 lb ft

BRAKE SPRING DATA

Brake Shoe Leaf Spring Offset — Model COD	0.50/0.52 in.
Brake Shoe Friction Spring Loading	8 lb minimum

RECOMMENDED LUBRICANTS — United Kingdom

<table>
<tr><th>Usage</th><th>BP</th><th>Castrol</th><th>Duckhams</th><th>Esso</th><th>Gulf</th><th>Mobil</th><th>Petrofina</th><th>Shell</th><th>Texaco</th></tr>
<tr><td>Compressor Drive Belt Jockey Pulley Bearings
Brake Pedal and Relay Lever Bearing Rollers</td><td>Energrease L.2</td><td>Castrol LM Grease</td><td>LB.10 Grease</td><td>Esso Multi-purpose Grease H</td><td>Gulflex A</td><td>Mobilgrease MP</td><td>Fina Marson HTL2</td><td>Retinax A</td><td>Marfak All Purpose</td></tr>
<tr><td>Brake Pedal and Relay Lever Bushes
Parking Brake Linkage</td><td colspan="9">Rocol M204G Grease</td></tr>
<tr><td>Brake Shoe Links, Spacers, Anchor Plates and Shoe Supports
Lockheed Expanders
Lockheed Rear Brake Shoe Rollers</td><td>—</td><td>—</td><td>Duckhams Keenol</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td></tr>
<tr><td>Bisectors and Brake Cylinders</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>Retinax M</td><td>—</td></tr>
<tr><td>Girling Brake Cylinders
Girling Master Cylinder
Girling Load Sensing Valve Dust Covers</td><td>—</td><td>Castrol/ Girling Rubber Grease(Red)</td><td>Q4590 Rubber Grease</td><td>Esso TSD 803</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td></tr>
<tr><td>Clayton Dewandre Master Cylinder Primary Piston Recess</td><td colspan="9">Rocol Molytone C</td></tr>
<tr><td>Brake Air Pressure Units
Clayton Dewandre Load Sensing Valve
Air Pressure Servo</td><td colspan="9">Rocol E1A Grease</td></tr>
<tr><td>Master Cylinder Actuator Wick
Spring Brake Actuator Wick
Lever Lock Actuator Wick
Clayton Dewandre Suspended-vacuum Servo Packing and Wick</td><td colspan="9">Clayton Dewandre Power Cylinder Oil</td></tr>
<tr><td>Hydraulic System</td><td colspan="9">Lockheed Super 105 Brake Fluid</td></tr>
<tr><td>Westinghouse Parking Brake Control Valve</td><td colspan="9">Rocol MTS 2000 Grease</td></tr>
<tr><td>Parking Brake Control Valve Hydraulic Damper</td><td colspan="9">Dow Corning MS 200/1000 Grease</td></tr>
<tr><td>Girling Brake Expanders and Adjusters</td><td colspan="9">Girling Brake Grease</td></tr>
<tr><td>Clayton Dewandre Suspended-vacuum Servo Levers</td><td colspan="9">Valvoline X ALL</td></tr>
</table>

RECOMMENDED LUBRICANTS – Overseas

Usage	Specification
Compressor Drive Belt Jockey Pulley Bearings Brake Pedal and Relay Lever Bearing Rollers	GM 4733–M
Brake Pedal and Relay Lever Bushes Parking Brake Linkage	Special compound of molybdenum disulphide and extreme viscosity fluids.
Brake Shoe Links, Spacers, Anchor Plates, and Shoe Supports Lockheed Expanders Lockheed Rear Brake Shoe Rollers	GM 4550–M
Bisectors and Brake Cylinders	GM 4613–M
Girling Brake Cylinders Girling Master Cylinder Girling Load Sensing Valve Dust Covers	Castor oil base grease, harmless to rubber
Clayton Dewandre Master Cylinder Primary Piston Recess	Castor oil and calcium base grease, harmless to rubber
Brake Air Pressure Units Clayton Dewandre Load Sensing Valve Air Pressure Servo	Rocol E1A grease
Master Cylinder Actuator Wick Spring Brake Actuator Wick Lever Lock Actuator Wick Clayton Dewandre Suspended-vacuum Servo Packing and Wick	GM 4579–M
Hydraulic System	GM 4653–M
Westinghouse Parking Brake Control Valve	Rocol MTS 2000 Grease
Parking Brake Control Valve Hydraulic Damper	Dow Corning MS 200/1000 Grease
Girling Brake Expanders and Adjusters	Girling Brake Grease
Clayton Dewandre Suspended-vacuum Servo Levers	Bentonite and mineral oil base grease containing zinc oxide

DIRECT-VACUUM SERVO-ASSISTED HYDRAULIC SYSTEM

The service brake operates on the front and rear wheels through a hydraulic system assisted by a Clayton-Dewandre direct-vacuum servo.

The parking brake operates on the rear brakes by means of a cable and rods from a lever mounted between the seats.

The hydraulic brakes are of the leading/trailing shoe type, operated by double acting cylinders from a master cylinder mounted with the servo on the inside of the chassis frame sidemember.

On gasoline-engined models the servo utilises vacuum developed in the intake manifold. On diesel-engined models the vacuum is created by an engine driven exhauster which is connected to the servo through a vacuum reservoir.

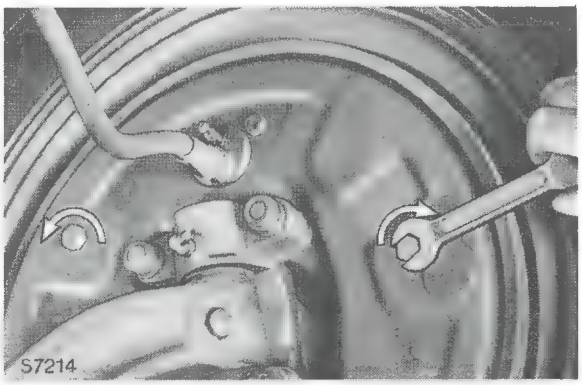
1 BRAKE ADJUSTMENT

Before adjusting the brakes, check and if necessary, adjust the hub bearings.

Check also for excessive wear of the shoe facings. These can be examined through the inspection hole in each flange plate.

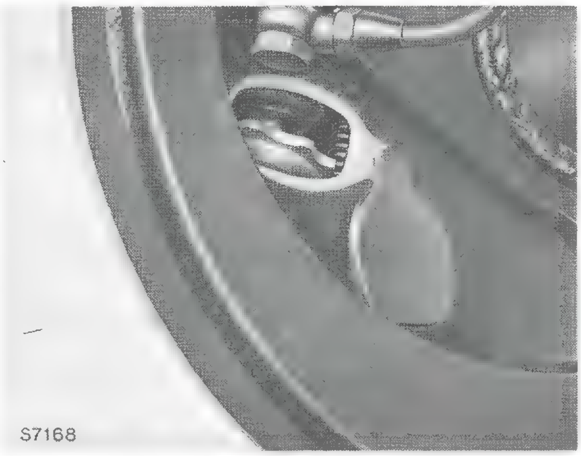
There are two adjusters on each front brake.

To adjust brakes turn adjusters in direction shown until shoes are hard against drums. Adjusters should then be backed-off and readjusted until shoes are just clear of drums.



The single adjuster on each rear brake is protected by a rubber cover.

To adjust brakes, turn adjuster forward on left-hand side and rearward on right-hand side until shoes are hard against drums. Adjusters should then be turned in reverse direction until the shoes are clear of the drums.



All shoes must be centralized in relation to the drums during brake adjustment by applying heavy pressure to the brake pedal.

The parking brake is adjusted automatically with the footbrake and normally no other adjustment is required. If there is excessive parking brake lever travel after footbrake adjustment has been completed then the parking brake linkage must be adjusted (see Section 17a).

2 BLEEDING THE HYDRAULIC SYSTEM

Before bleeding commences, vacuum must be exhausted from servo by depressing brake pedal several times, and front brake adjusters must be backed off completely.

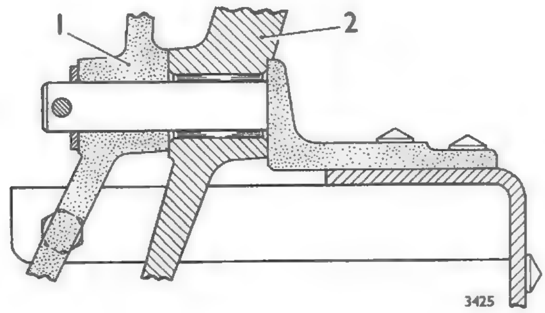
Engine must not be run whilst bleeding is carried out.

Bleed each brake in turn, using rapid full travel strokes of brake pedal, in the sequence left-hand rear, right-hand rear, left-hand front, right-hand front.

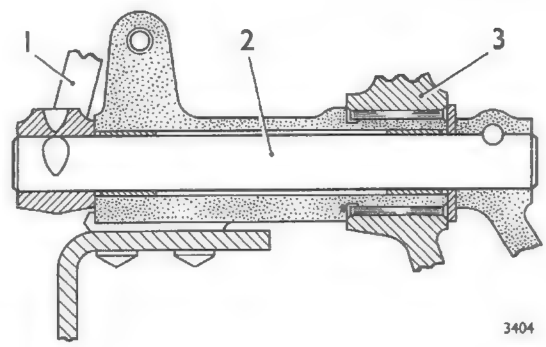
A check must be made during and after bleeding on the fluid level in the master cylinder reservoirs.

3 BRAKE PEDAL AND LINKAGE

The brake pedal (2) is mounted on bearing rollers and, on right drive vehicles, is supported together with the clutch pedal (1) on a shaft attached to the chassis frame.



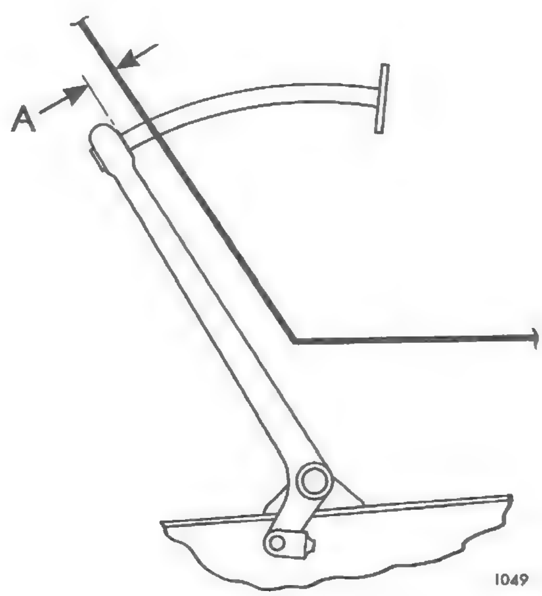
On left drive vehicles the brake pedal (3) pivots on the outside of a bracket which supports the clutch pedal (1) and shaft (2).



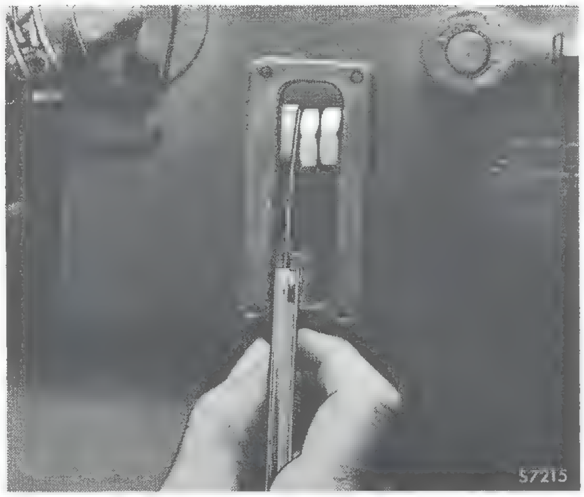
3a BRAKE PEDAL SETTING

It is not usually necessary to alter the brake pedal setting unless parts of the linkage have been disturbed.

Setting may be adjusted by disconnecting servo push rod at brake pedal lever and rotating clevis until distance between pedal lever and underside of toe panel (dimension 'A'), is 0.60 in. Check dimension when push rod is held in forward position with clevis pin installed.



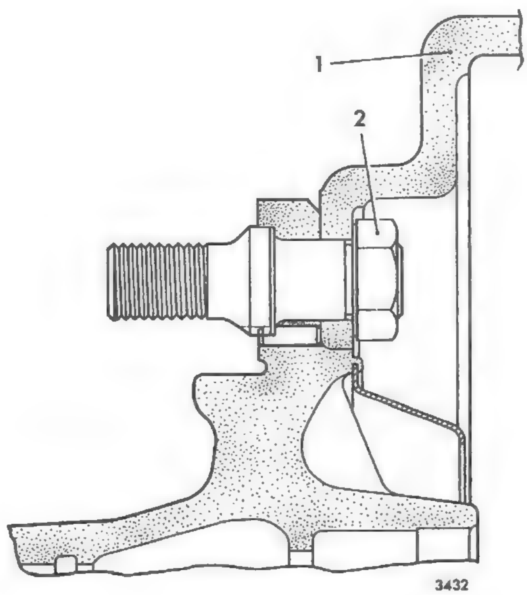
After adjusting pedal setting remove inspection cover from servo housing and check that 0.015 in. clearance exists between servo push rod and master cylinder push rod.



Clearance is adjusted by slackening locknut and rotating bolt while holding servo push rod in forward position.

4 BRAKE DRUMS

The front and rear brake drums are bolted to the inside of the hubs except on hypoid rear axles where the drum (1) is retained by a nut (2) on the inner end of the wheel bolts.



Hub and drum must be removed and installed as an assembly as described in Training Manuals TS 1085 and TS 1086.

When assembling a new drum to hub, ensure mating surfaces are clean and free from damage.

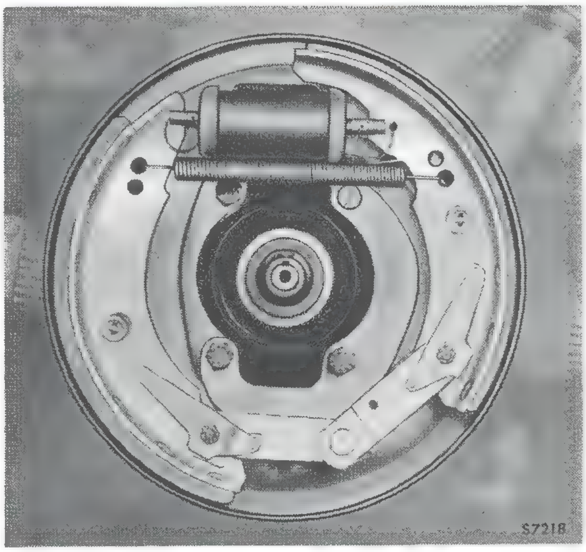
On hypoid rear axles, secure retaining nuts by staking.


S7216

5 FRONT BRAKE SHOES

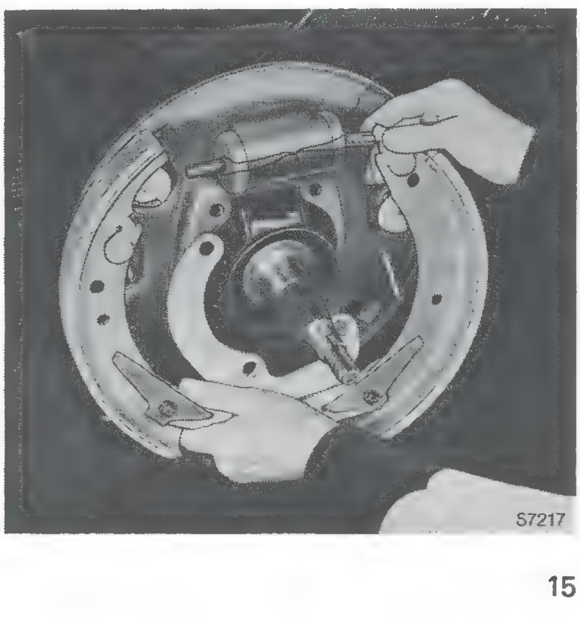
The front brakes have fabricated shoes with facings secured by rivets. The leading shoe facings are thicker in section than the trailing shoe facings and all shoes are provided with cam-type adjusters. The shoes are held in contact with guide plates, welded to the flange plate, by spring-loaded retainers.

The shoe link pivots are stiffened by leaf-type friction springs.


S7218

When removing brake shoes, secure brake cylinder pistons with wire to prevent displacement.

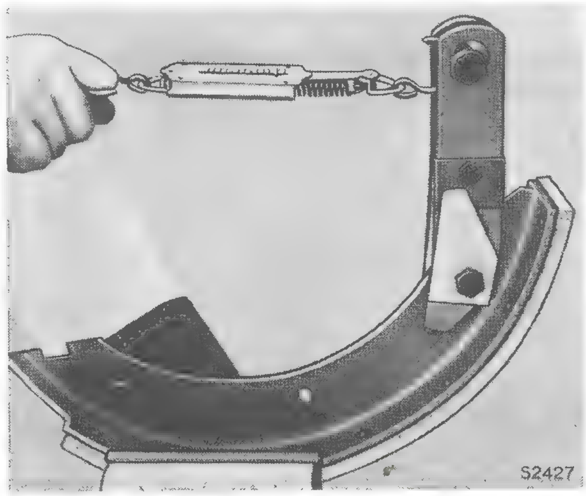
Shoes may be removed complete with links after removing anchor plate bolts.


S7217

When assembling links to shoes, ensure heads of bolts will be adjacent to flange plate when brakes are installed on vehicle.

SECTION A-A 3709

After assembling links to shoes check tension of friction springs with a spring balance. If friction load is less than specified, renew springs.

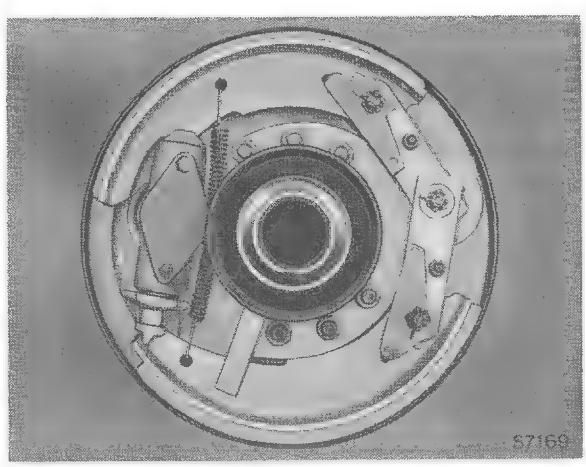


Before installing shoes smear pivots, guide plates and push rod ends with recommended grease, ensuring that no lubricant is allowed between friction springs and shoes or links.

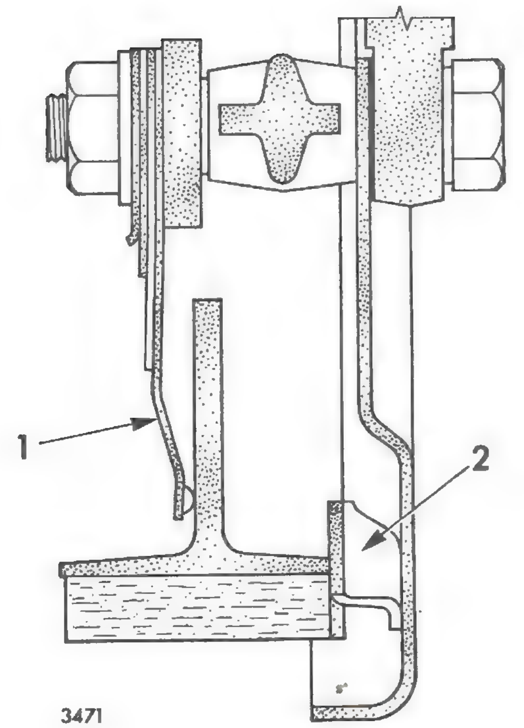
Install slotted-head bolt in upper hole in anchor plate.

6 REAR BRAKE SHOES

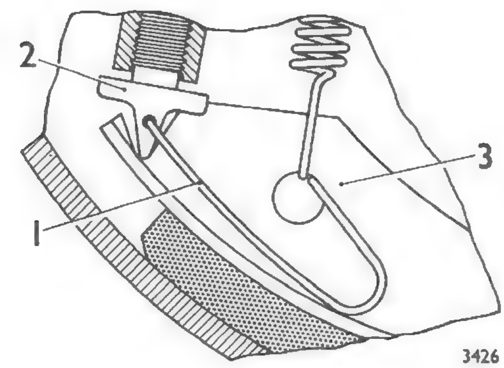
The rear brakes have fabricated shoes with facings secured by rivets. The leading shoe facings are thicker in section than the trailing shoe facings. The shoe adjusters are of the threaded push rod type.



On semi-floating axles, the leading shoes are held in contact with guide plates (2) on the flange plate by a leaf-type spring (1) secured to the anchor plate bolts.



The shoes are provided with a single pull-off spring and the leading shoe(3) is held in contact with the adjuster (2) by a spring retainer (1).



On fully-floating axles, the leading shoe is provided with a support welded to the anchor plate and individual shoe pull-off springs are used.

The shoe link pivots are stiffened by leaf-type friction springs.

Shoes may be removed complete with links after removing anchor plate bolts.

When assembling links to shoes ensure heads of bolts will be adjacent to flange plate when brakes are installed on vehicle.

SECTION A-A

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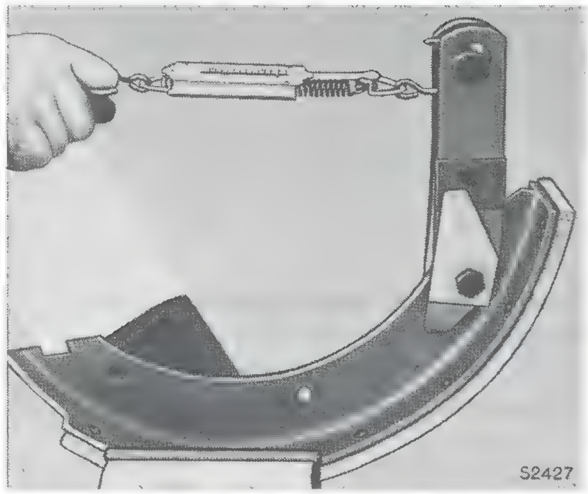
S2427

After assembling links to shoes check tension of friction springs with a spring balance. If friction load is less than specified, renew springs.

Before installing shoes smear pivots, guide plates and shoe supports with recommended grease, ensuring that no lubricant is allowed between friction springs and shoes or links.

Assemble pull-off springs with squared end attached to shoes.

Check offset 'A' of leaf spring on Model COD and reset to specified dimension if necessary.

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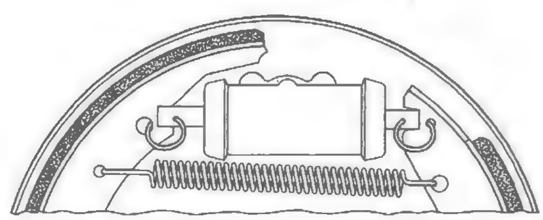
7 FRONT BRAKE CYLINDERS

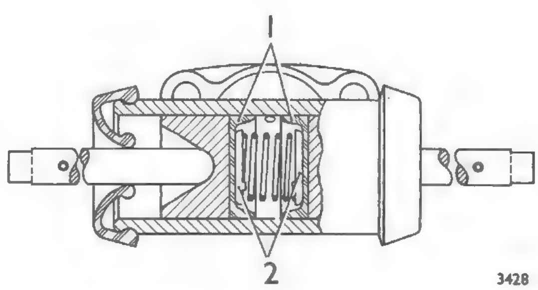
The front brake cylinders are bolted to the inside of the flange plates and contain two opposed pistons and seals separated by a coil spring. The pistons operate short push rods connected to the upper ends of the brake shoes by anchor springs.


3427

Seals should be renewed whenever cylinder is disassembled.

Before reassembly smear cylinder bore, seals and pistons with clean brake fluid.

Assemble seals (1) and spring seats (2) with recessed sides towards each other and ensure spring locates in spring seats.

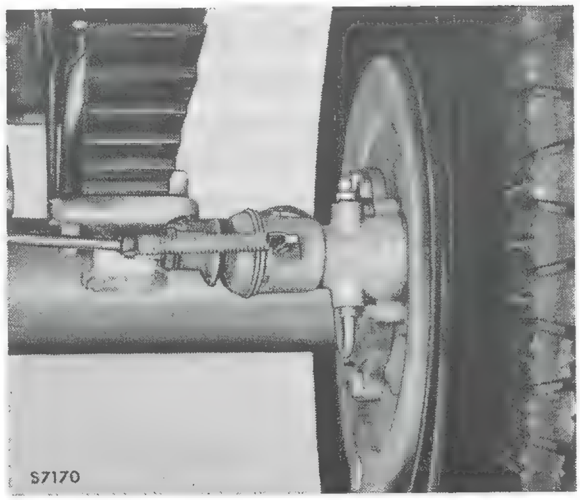


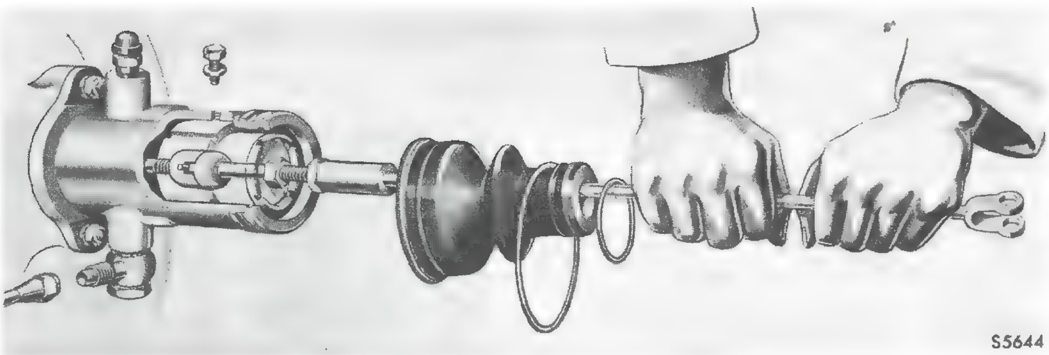
3428

Install spacer between brake cylinder and flange plate on Model COD.

8 REAR BRAKE CYLINDERS

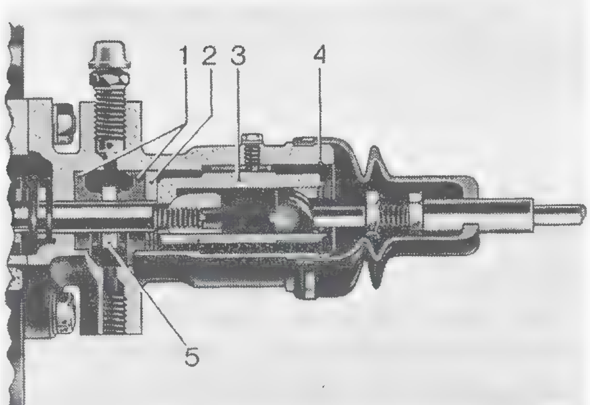
The rear brake cylinders are attached to the outside face of the flange plates and operate bisectors attached to the inside of the plates. Each cylinder consists of a piston and two seals separated by a spacer. The piston contacts a cylindrical link which provides a connection for the parking brake rod. A bleed screw is provided in the top of the cylinder.





Before removing cylinder retaining nuts disconnect rod from bell crank lever or relay lever and remove pull rod link stop bolt from cylinder. Detach rod return spring and rubber boot and push rod into brake cylinder. Turn rod slowly anti-clockwise until it engages slot in bisector pull rod nut then continue turning rod to unscrew nut.

To disassemble cylinder remove circlip (4) and withdraw link (3), piston (2), seals (1) and spacer (5).



Link, parking brake pull rod and bisector pull rod nut are serviced as an assembly.

Seals should be renewed whenever cylinder is disassembled.

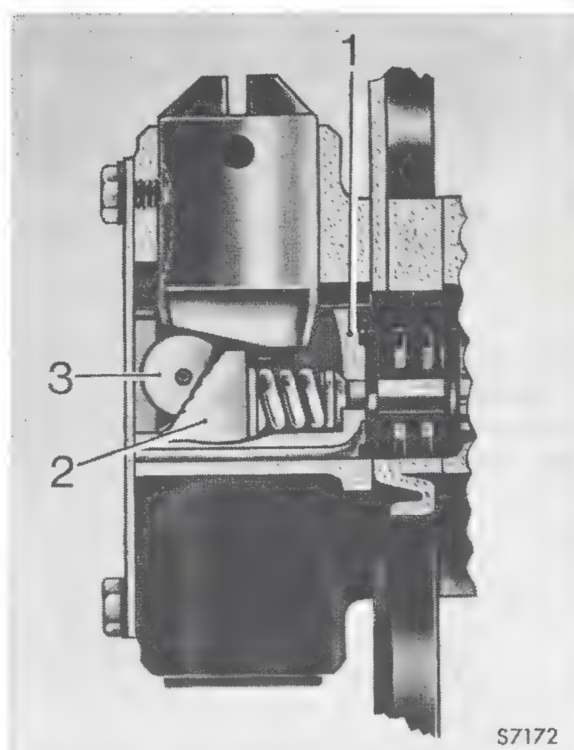
Before reassembling cylinder smear cylinder bore and seals with clean brake fluid. Smear pull rod link with recommended grease.

When reconnecting link to bisector pull rod, push bell crank lever rod into cylinder to engage bisector pull rod nut and rotate rod clockwise until resistance is felt. Rod must then be turned anti-clockwise until stop bolt can be engaged in slot in link. When installing boot, pack end of cylinder with recommended grease and position vent hole in boot at bottom.

Adjust length of rods as described in Section 17a.

9 REAR BRAKE BISECTORS

Each rear brake bisector consists of a cylinder containing an expander (1) and two plungers. The inner edges of the plungers are inclined and contact two rollers (3) mounted in a guide (2) in the expander. The guide and rollers can move relative to the expander for automatic centralizing of the brake shoes in the drum.



Before removing bisector, brake cylinder must be removed.

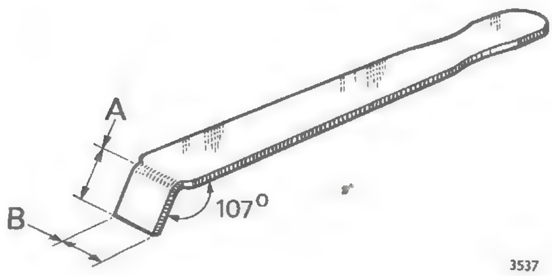
When disassembling bisector, plungers may be withdrawn after removing end cover bolts. Guide and rollers can be drifted out from either side of expander. Rollers can be withdrawn from guide after removal of retaining pins.

Before reassembly, inspect all parts for wear and scores. All parts must be liberally smeared with recommended grease.

When installing rollers and guide in expander, pull rod spring must be compressed with a roller guide installer.


S7173

Constructional details of roller guide installer. Dimension 'A' is 0.94 in. and dimension 'B' is 0.80 in.



3537

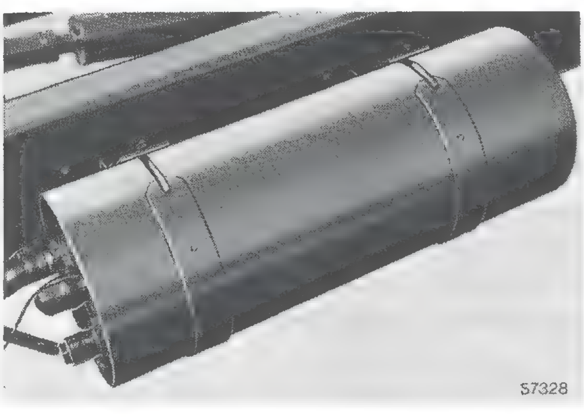
When installing end cover, ensure spring attaching lug faces inwards and is displaced towards leading shoe when assembly is installed on vehicle.

Align slots in plungers with cover bolt holes before installing bolts.

Install brake cylinder as previously described.

10 VACUUM RESERVOIR

On diesel-engined models, vacuum is stored in a reservoir mounted on the chassis side-member.


S7328

The reservoir contains a switch which in the event of a loss in vacuum operates a lamp and buzzer in the cab.

11 LOW VACUUM WARNING SWITCH

On diesel-engined models a low vacuum warning switch is incorporated in the reservoir to actuate a buzzer and warning lamp in the vehicle if the vacuum falls below the minimum required. The switch is a sealed unit and consists of a body, spring-loaded diaphragm and contacts.

11a LOW VACUUM WARNING SWITCH – Operating Test

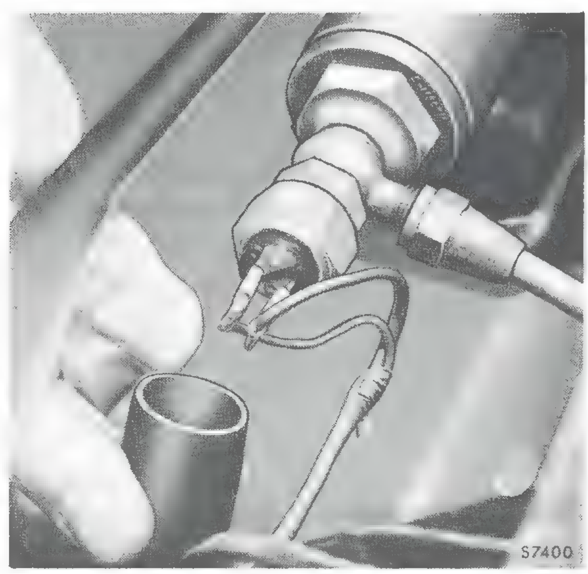
Operation of switch may be checked by installing a vacuum gauge and T-piece at reservoir switch boss.

With system evacuated and engine stopped, turn key-start switch to running position and reduce vacuum by applying and releasing footbrake.

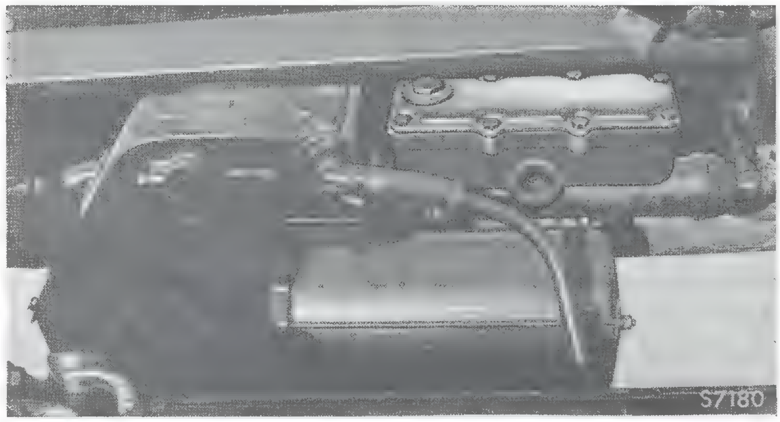
If switch fails to operate buzzer and warning lamp within specified limits it must be renewed.

12 STOP LAMP SWITCH

The stop lamp switch, attached to the rear of the master cylinder adjacent to the hydraulic front brake pipe connection, is a sealed unit and must be renewed if defective. After renewing switch, bleed hydraulic system.



13 MASTER CYLINDER

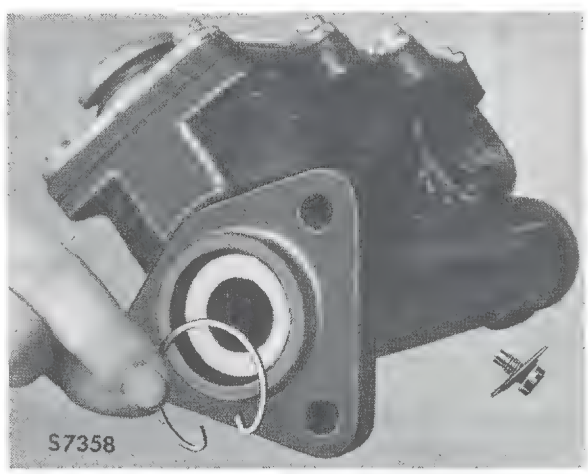


The hydraulic tandem master cylinder is mounted together with the servo on the inside of the chassis sidemember. The cylinder consists of a divided fluid reservoir which is connected by drillings to a cylinder containing a primary piston and a secondary piston. The piston heads are drilled to allow fluid to flow from the annular space around the pistons into the cylinder. Adaptors at the rear and side outlets incorporate check valves and provide attachment for the front and rear hydraulic brake pipes.

13a MASTER CYLINDER — Removal and Disassembly

To facilitate removal of master cylinder attaching nuts, servo piston cylinder should be removed. An access aperture is provided under driver's seat.

When disassembling master cylinder, piston stop screw and front circlip must be removed before pistons can be withdrawn. Care must be taken to avoid damage to cylinder bore.



During cleaning of master cylinder components a check should be made for fractured or weak springs, damaged or corroded check valves and any abnormal wear.

13b MASTER CYLINDER — Reassembly

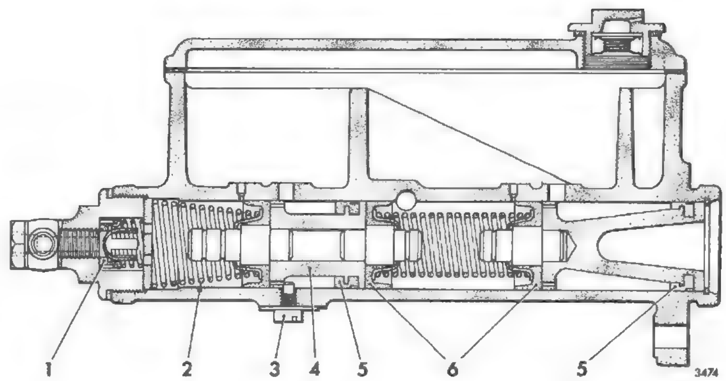
On reassembly smear all components with clean brake fluid.

Lips of secondary seals (5) on both pistons face towards rear of pistons.

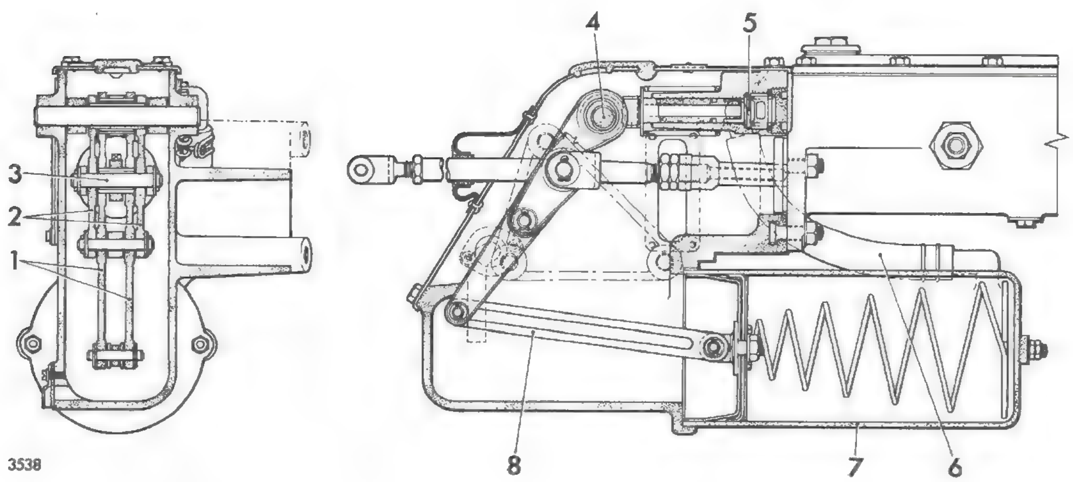
After installing secondary piston (4), insert stop screw (3) so that end of screw locates between flanges on piston.

Before installing rear adaptor and check valve (1), ensure smaller diameter of spring (2) locates in retainer in recessed side of piston seal.

Lips of seals (6) between pistons face towards each other.



14 DIRECT-VACUUM SERVO



The servo unit consists of a housing containing two reaction levers (1), two brake levers (2) and a vacuum valve (5).

The levers are secured together by a pivot pin (3) and supported by a fixed shaft (4) in the top of the housing. The levers also pivot on two bushes, the inner bush carrying the brake levers and the outer bush the reaction levers.

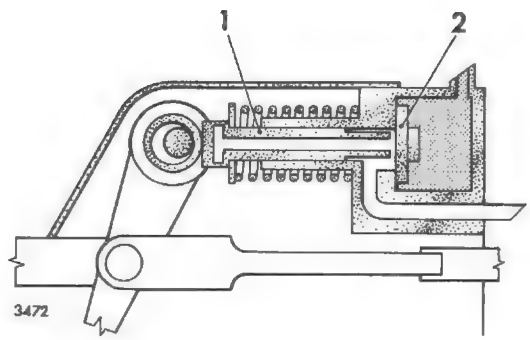
Spacers are interposed between the upper ends of the brake levers and the housing, and a roller, which operates the vacuum valve plunger, is located between the upper ends of the reaction levers.

The servo and master cylinder push rods are pinned to the levers below the fixed support shaft.

A cylinder (7), attached to the rear of the servo housing, contains a spring-loaded piston connected to the lower end of the reaction levers by slotted links (8).

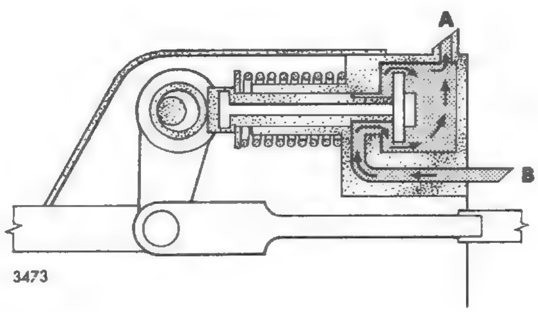
The vacuum valve is located in the upper part of the servo housing and is connected by an air hose (6) to the rear end of the servo cylinder.

In the 'brakes off' position the reaction levers are held in the forward position by the vacuum valve plunger spring. In this position the rear end of the plunger (1) is clear of the vacuum valve (2).



On application of the brake pedal, movement is transmitted through the servo push rod to the reaction levers which pivot momentarily on the lower pivot pin. The top of the reaction levers then move through the clearance between the fixed support shaft and the levers and the roller moves the vacuum valve plunger until it contacts the vacuum valve.

This seals the atmospheric port through the plunger and further movement opens the vacuum valve. Air is then exhausted from the rear of the servo cylinder through port 'B', to the engine via port 'A', and the piston moves against the pressure of the return spring. The effort exerted at the servo push rod together with the piston pull acting in the same direction, is transmitted via the brake levers to the master cylinder.



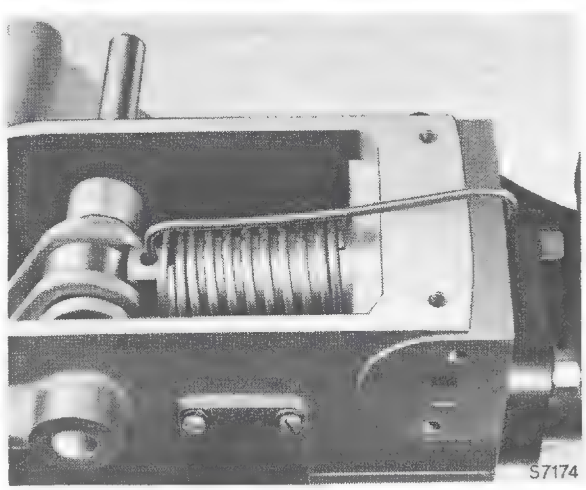
If the brake pedal is held in the 'brakes on' position a state of balance is created between the effort on the push rod and the pressure differential across the servo piston. This restores the reaction levers centrally across the support shaft and closes the vacuum valve without opening the atmospheric port.

When all pressure is removed from the brake pedal the plunger returns to the forward position, closing the vacuum valve and opening the atmospheric port through the plunger. This relieves the vacuum in the cylinder and allows the piston to return to the 'brakes off' position.

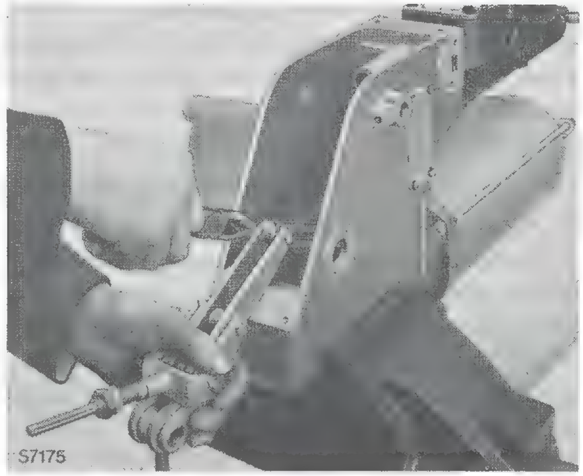
14a DIRECT-VACUUM SERVO — Disassembly

Access to fixed support shaft, levers and vacuum valve plunger is gained by removing top cover.

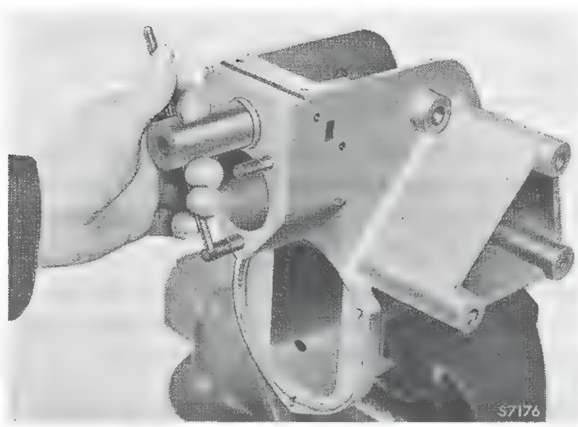
Before removing fixed support shaft it is advisable to retain vacuum valve plunger with a length of wire as shown. Shaft is retained by a locking bolt.



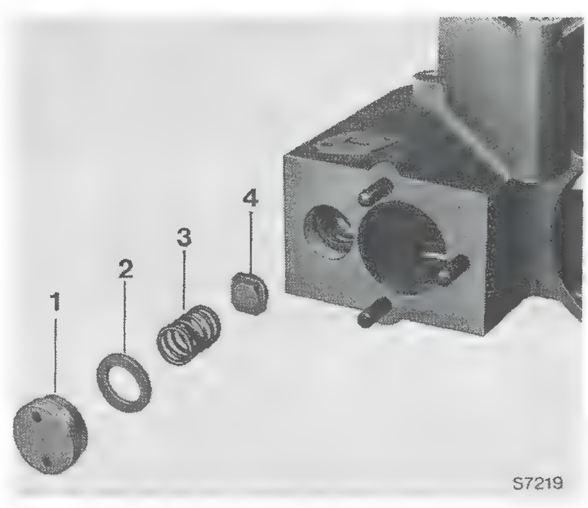
Servo piston must be pushed towards rear of cylinder to enable lever assembly to be lifted clear of housing for access to pin securing piston links.



After removing master cylinder, vacuum valve plug can be removed with a peg wrench. Access to master cylinder attaching nuts is facilitated by removal of servo cylinder.

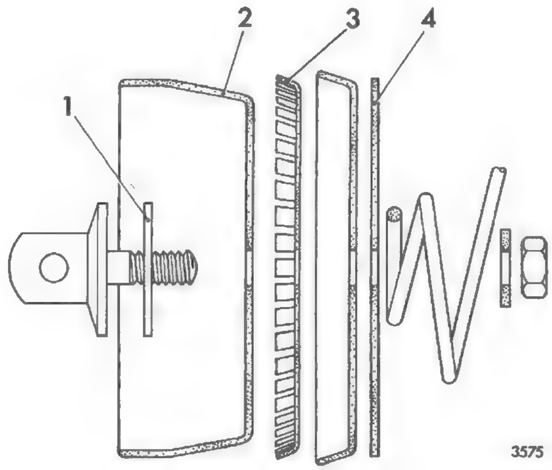


Vacuum valve consists of a valve disc (4), return spring (3), seal (2) and retaining plug (1).

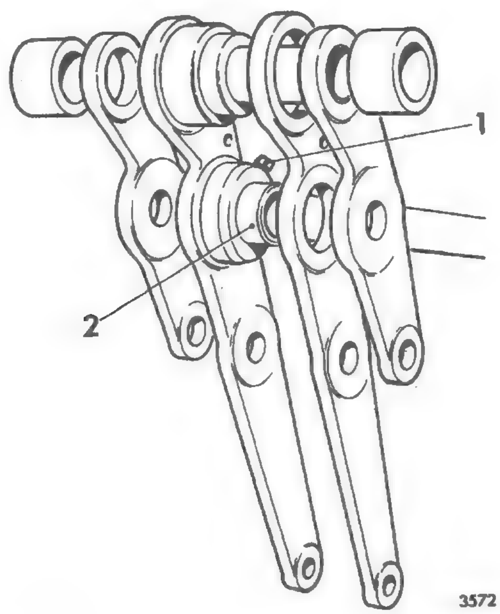


Before reassembly all parts must be cleaned and checked for damage and wear. A new leather seal for the servo piston must be in a soft pliable condition.

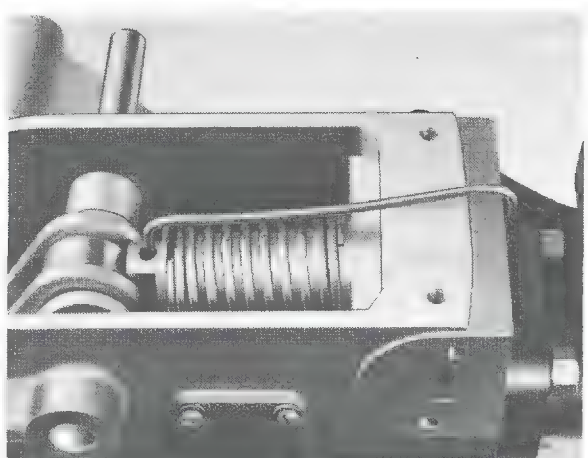
Assemble piston (2), expander (3), backing plate (4) and fibre washer (1) in correct order before installation in servo cylinder. To enable leather seal to work effectively, smear cylinder bore with engine oil and move piston up and down cylinder several times.



Reassemble brake and reaction levers as shown, ensuring that screw (1) is located in push rod eye bush (2).

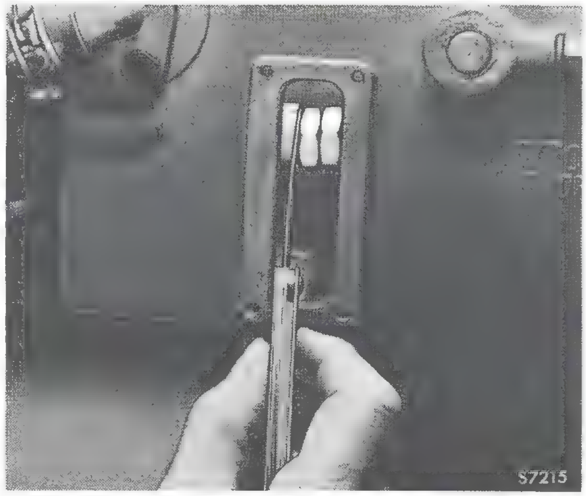


Before installing fixed support shaft, vacuum valve plunger should be retained by a length of wire. Ensure locating hole in shaft aligns with locking bolt hole in housing.



Lubricate brake and reaction levers liberally with engine oil before installing top cover.

After installing master cylinder on servo, check clearance between servo push rod and end of master cylinder push rod. Clearance should be 0.015 in. when servo push rod is held in forward position.



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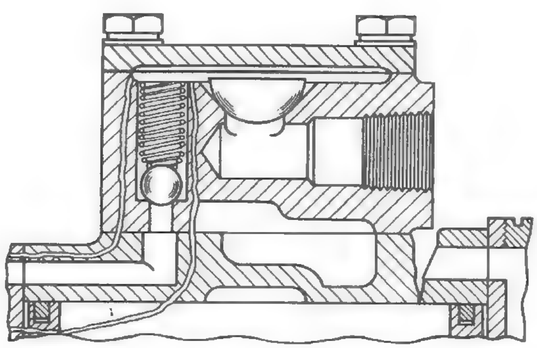
15 EXHAUSTER VALVE BODY

The exhauster valve body is bolted to the exhauster and incorporates a half-round rubber non-return valve and a spring-loaded ball snifter valve.

Engine oil for lubrication of the exhauster enters through a filter screwed into the valve body.



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Before removal, mark valve body and cover in relation to exhauster body, and remove oil filter.

Non-return valve, snifter valve spring and ball may be withdrawn after removing bolts securing valve body and cover.

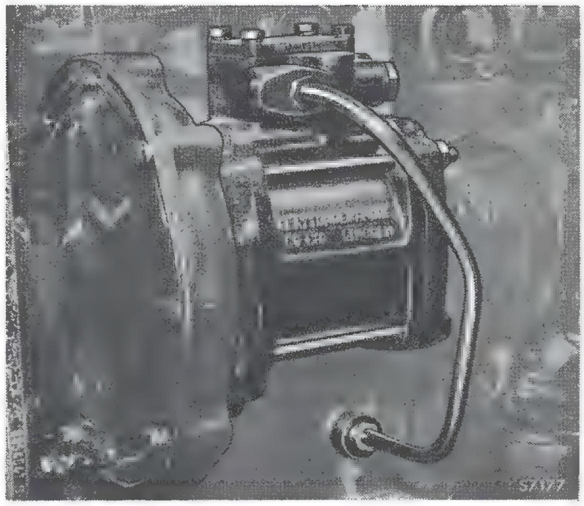
Check snifter valve spring for corrosion and distortion.

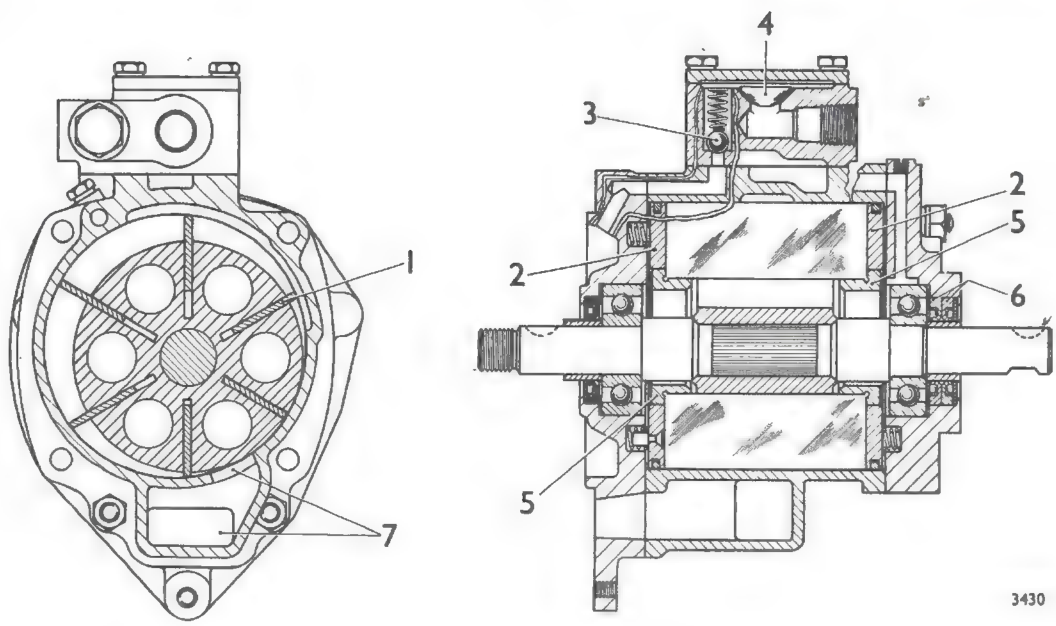
Snifter valve ball can be reseated by tapping it on to the seat with a brass drift.

16 EXHAUSTER

The rotary-type exhauster mounted on the rear of the timing gear case generates a partial vacuum for operation of the brake servo.

The exhauster is driven by the crankshaft through an idler gear and is lubricated by oil drawn from the engine oil pan by vacuum generated by the exhauster. Oil returns to the timing case via the air and oil outlet port at the bottom of the exhauster.





Seals located in the end covers prevent air entering the exhauster body. A double seal arrangement (6) in the rear cover prevents oil leakage due to pressure in the exhauster body under starting conditions.

Six blades (1) located in slots in the rotor are sealed at each end by spring-loaded plates (2). At low engine speeds, a spigot ring (5) at each end of the rotor maintain the blades in contact with the exhauster body. As the engine speed increases the blades are held in contact with the body by centrifugal action.

The exhauster operates by compressing air between the blades as the rotor turns until, at a point of maximum compression, air is expelled through the air and oil outlet port (7). The resulting vacuum is filled by air drawn from the vacuum reservoir, via a half-round rubber non-return valve (4) in the valve body at the top of the exhauster.

When the required degree of vacuum in the reservoir is obtained, the snifter valve (3) in the exhauster valve body admits air from the timing case to the intake port and limits further exhausting of the reservoir.

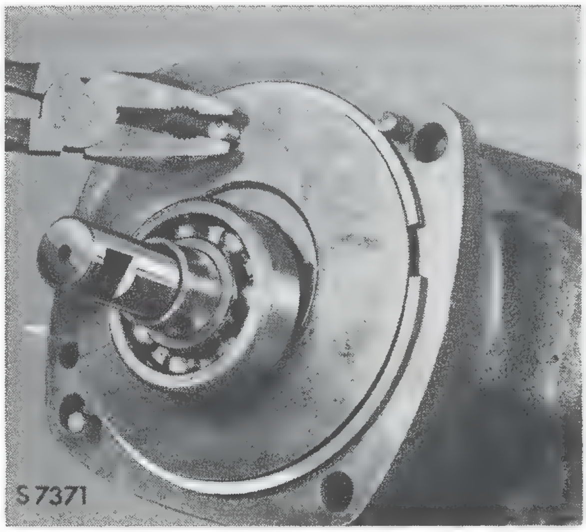
Removal and installation of the exhauster is described in Training Manual TS 1084.

16a EXHAUSTER — Disassembly and Inspection

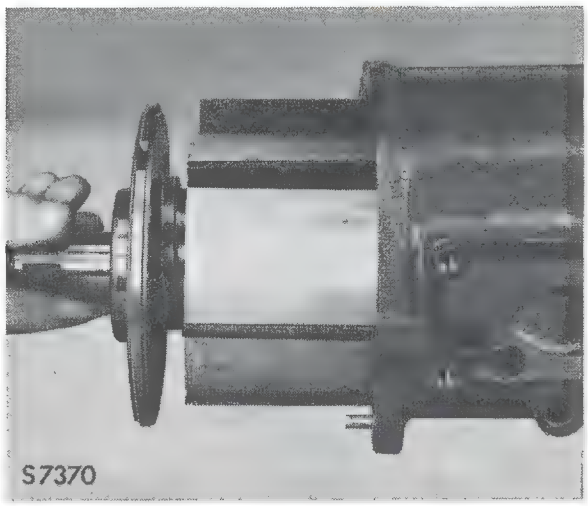
Remove and disassemble exhauster valve body as previously described.

Front and rear end covers may be detached from exhauster body after removing nuts and lockwashers.

Rear sealing plate and spring ring can be removed by gripping locating peg.

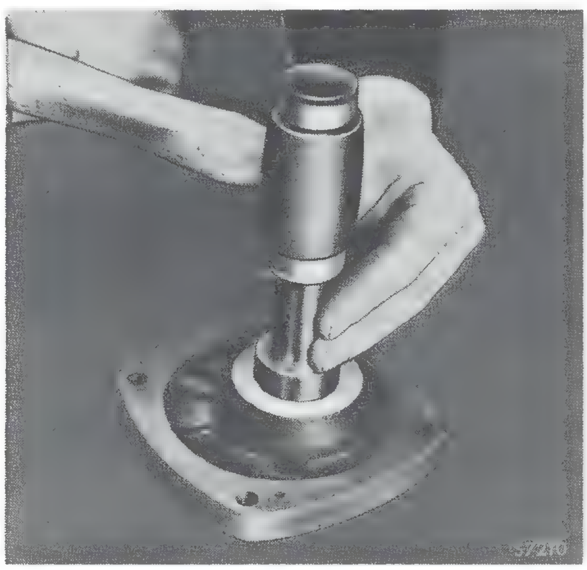


Rotor, blades, bearings and front sealing plate may be removed as an assembly from front of exhauster body.



Mark rotor blades in relation to rotor to ensure correct relative positioning if re-used.

Remove seal inner back plates before drifting out end cover seals.



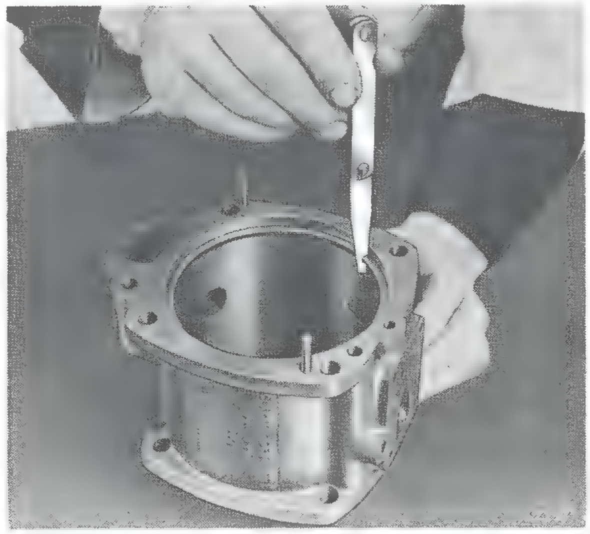
Ensure all drillings in end covers, body and sealing plates are not obstructed.

Excessive longitudinal rippling of body bore necessitates renewal of body.

16b EXHAUSTER — Reassembly

Discard all components which will be replaced from a major or minor repair kit and lubricate all working surfaces with engine oil.

Before installing a new spring ring, check gap is within specified limits with ring squarely located in exhauster body.

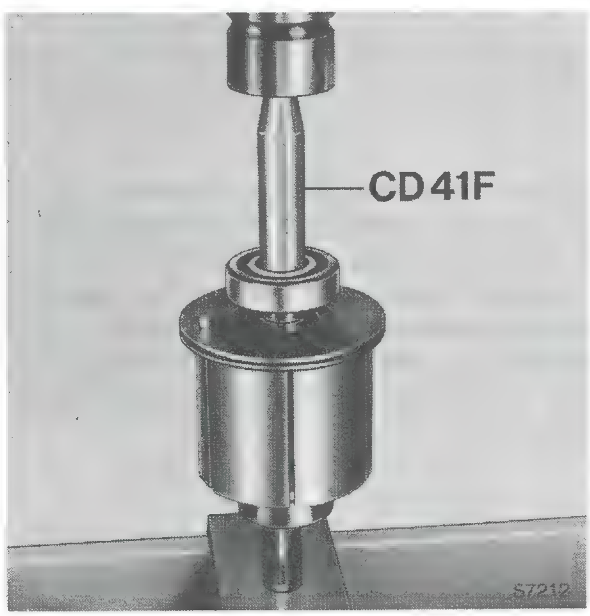


Smear lips of seals with engine oil and place seal outer back plates in end covers before installing seals. Seals must be driven home, open side first, until seals contact abutment face in covers.

Inner seal in rear cover must be driven home, closed side first, until contact is made with outer seal.

Before installing new bearings place spigot rings and sealing plates on shaft with flange of spigot rings and sealing plate locating pegs towards ends of shaft.

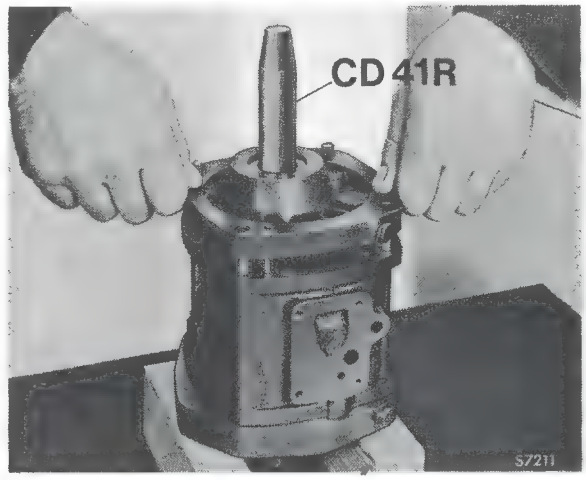
Use Installers CD41F and CD41R when pressing respective front and rear bearings and seal collars on to shaft.



Check for free movement of rotor blades before compressing sealing plate spring rings and installing rotor assembly in exhauster body.

Before installing end covers, place seal inner back plates and sealing plate springs in position ensuring that special spring which accommodates sealing plate peg is installed in correct recess in each cover.

Use Installers CD41F and CD41R to prevent damage to seals when installing front and rear end covers.



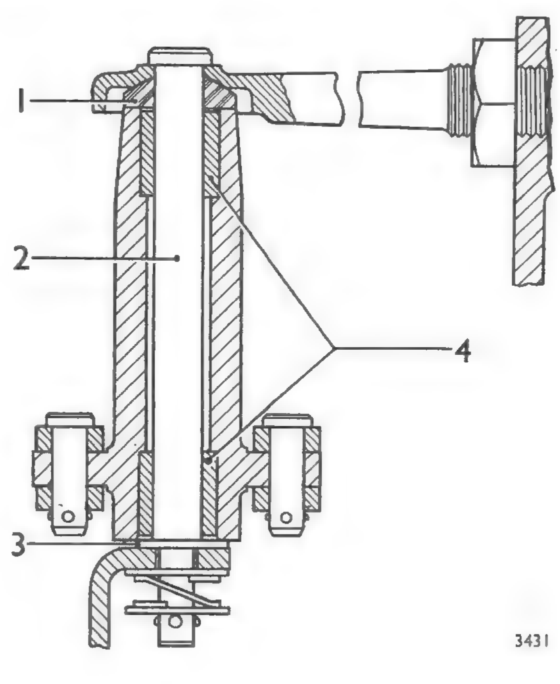
Ensure sealing plate peg engages correct spring recess in each cover.

17 PARKING BRAKE LEVER AND LINKAGE

The parking brake lever is bolted to a bracket attached to the chassis crossmember, and positioned between the driver's and passenger's seats.

A cable connects the lever to a vertically mounted bell crank lever attached to the rear axle housing. Rods connect the bell crank lever to the rear brake cylinders.

The bell crank lever pivots on a shouldered pin (2) supported by two brackets attached to the axle housing. A rubber cover (1) is interposed between the lever and the upper support bracket and a thrust washer (3) between the lever and the lower bracket. The bushes (4) are of the sintered-bronze type.

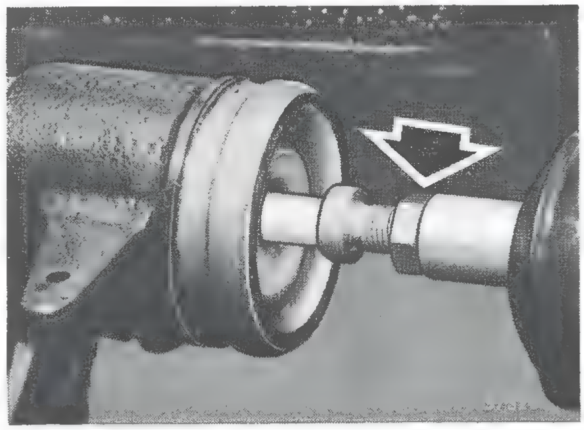


17a PARKING BRAKE LINKAGE – Adjustment

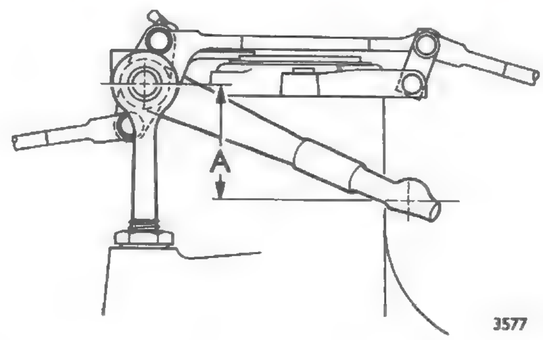
If excessive travel of the parking brake lever exists after the footbrake has been adjusted, the linkage must be reset.

Before setting linkage, turn rear brake adjusters until shoes are hard against drums.

Parking brake cable must be disconnected at brake lever and bell crank lever rod locknuts slackened. Rod locknut (arrowed) is exposed by sliding brake cylinder boot along rod after disconnecting rod return spring.



After disconnecting left-hand rod from bell crank lever and right-hand rod from relay lever, position bell crank lever centrally in slot of lower bracket and adjust length of rods until clevis pins can be inserted and dimension 'A' is 2.60 in. When adjusting length of rods eliminate free travel in brake cylinder link by pulling rods away from cylinder.



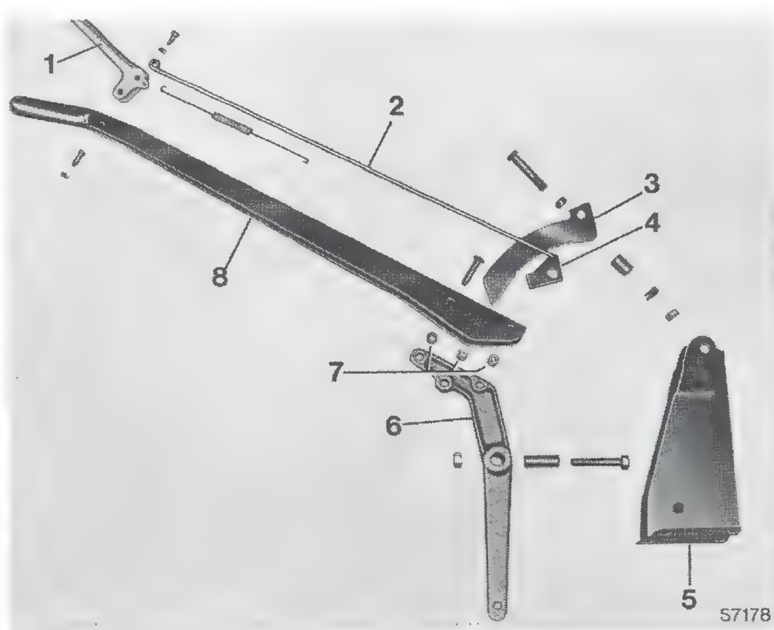
Adjust cable clevis until slack in cable is equal to two-thirds the diameter of clevis hole.

Install brake cylinder boots with ventilation hole at bottom and adjust rear brakes.

17b PARKING BRAKE LEVER AND CABLE

The parking brake lever consists of upper and lower levers (8 and 6), riveted together and pivoted in a support (5) attached to a bracket on the chassis crossmember. The support also provides attachment for the sector (3). The pawl (4) is operated by a rod (2) from a finger lever (1) bolted to the parking brake upper lever.

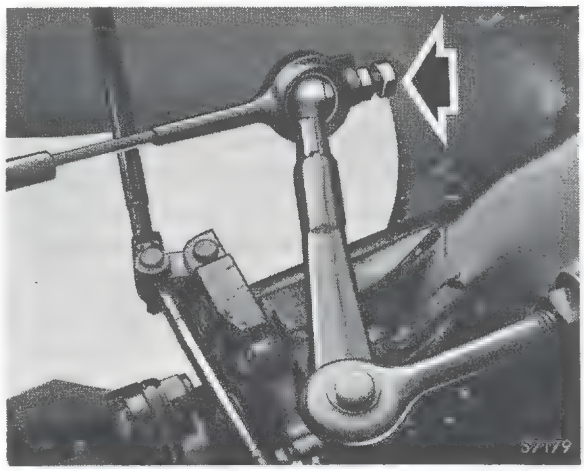
When reassembling upper and lower levers, spacers (7) must be on right-hand side when lever is installed in vehicle.



When installing sector bolt, place short spacer on same side as lever spacers.

After installing pawl rod and finger lever bolts, secure nuts by staking.

When attaching parking brake cable to bell crank lever, tighten screw (arrowed) fully and slacken a quarter of a turn before securing with locknut.



Adjust cable clevis so that slack in cable is equal to two-thirds of the diameter of the clevis hole.

GIRLING SUSPENDED-VACUUM SERVO-ASSISTED HYDRAULIC SYSTEM

The service brake operates on the front and rear wheels through a hydraulic system assisted by a Girling suspended-vacuum servo.

The parking brake operates on the rear wheels only through cables.

The hydraulic brakes are of the two-leading-shoe type at the front and duo-servo self-adjusting at the rear.

The Girling tandem master cylinder is mounted with the servo unit on the chassis front cross-member.

On gasoline-engined models the servo utilises vacuum developed in the intake manifold. A non-return valve is incorporated in the manifold connection. On diesel-engined models vacuum is created by an engine-driven exhauster.

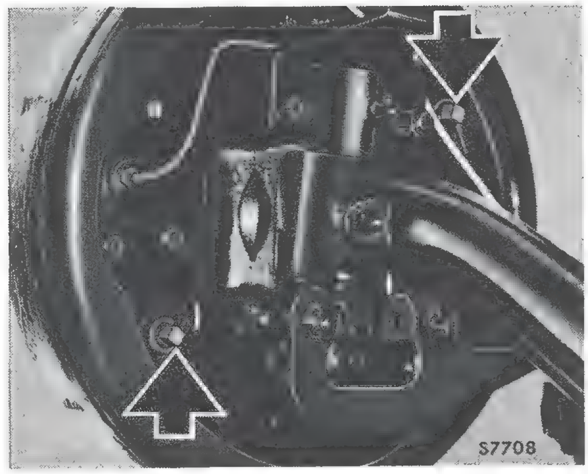
18 BRAKE ADJUSTMENT

Before adjusting the front brakes, check and if necessary, adjust the hub bearings.

Check also for excessive wear of the shoe facings. These can be examined through the inspection holes in each flange plate.

There are two adjusters on each front brake assembly.

To adjust brakes turn each adjuster clockwise until shoe is hard against drum then back off adjuster until drum is free to rotate.



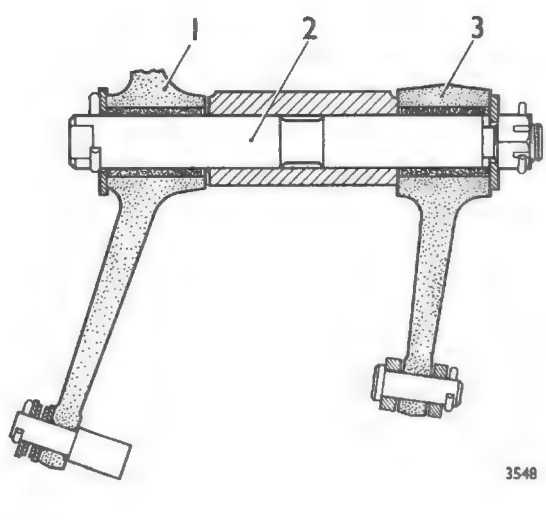
The rear brakes adjust automatically when the brakes are applied with the vehicle travelling in reverse.

19 BLEEDING THE HYDRAULIC SYSTEM

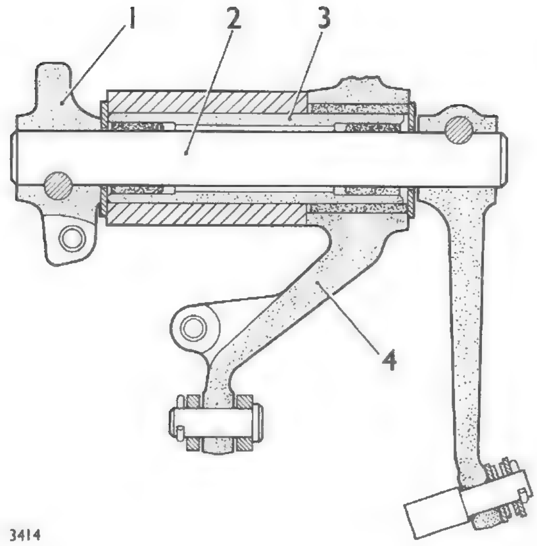
Refer to Section 2.

20 BRAKE PEDAL AND LINKAGE

The brake pedal (3) pivots on a shaft (2) mounted on the steering gear and on right drive vehicles the shaft also carries the clutch pedal (1).



On left drive vehicles the brake pedal (4) pivots on a sleeve (3) which is bushed to support the clutch pedal (1) and shaft (2).



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The bushes are of the non-metallic type.

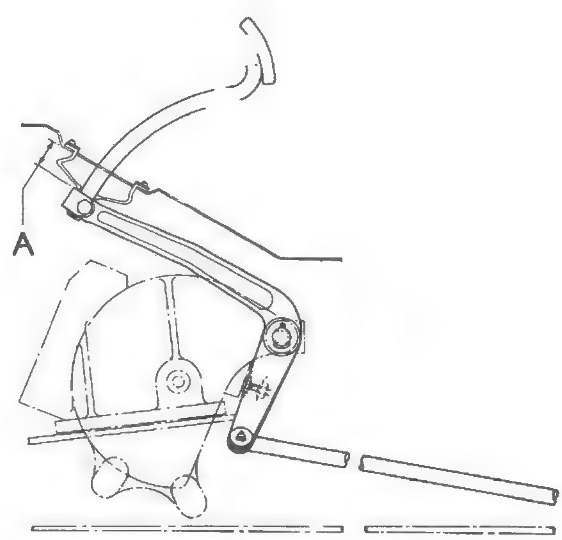
The pedal lever is connected by a push rod and relay lever to the servo push rod.

The relay lever is supported by brackets attached to the chassis frame and pivots on bearing rollers.

20a BRAKE PEDAL SETTING

It is not usually necessary to alter the brake pedal setting unless the stop bolt has been disturbed or parts of the linkage renewed.

Setting is adjusted by disconnecting servo push rod from relay lever and adjusting pedal stop bolt until dimension 'A', between pedal lever and underside of toe panel, is 1.00 in.



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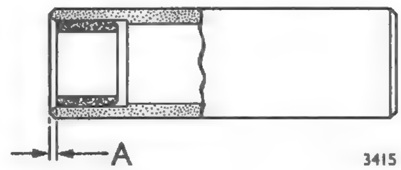
With end of relay lever held rearwards so that pedal stop bolt contacts steering gear housing, adjust servo push rod clevis until pin hole aligns with pin hole in relay lever. Shorten rod by rotating clevis half a turn before reconnecting to relay lever.

20b BRAKE PEDAL – Bush Renewal

The brake pedal and sleeve bushes are pre-finished and do not require reaming on assembly.

When renewing brake pedal bush, press bush into bore until flush with pedal outer face.

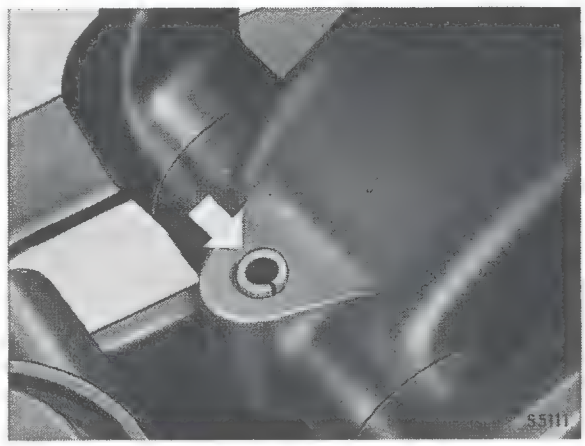
On left drive vehicles press bushes into brake pedal sleeve so that dimension 'A' is 0.06 in.



Press sleeve into steering gear until flush with clutch pedal side of gear.

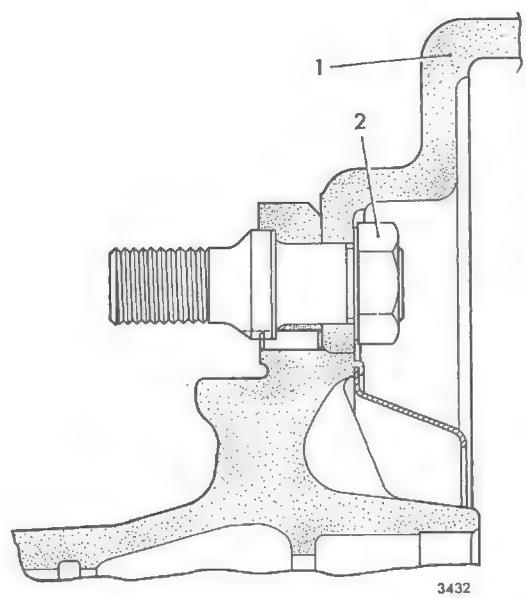
Before assembly, liberally smear bushes with recommended grease.

When installing brake pedal shaft on right drive vehicles, adjust brake and clutch pedal side clearance before installing retaining pin (arrowed). This may be achieved by assembling clutch pedal, washer, pin and brake pedal to shaft, and adjusting nut until side clearance on both pedals has been reduced to a minimum without causing pedals to bind.



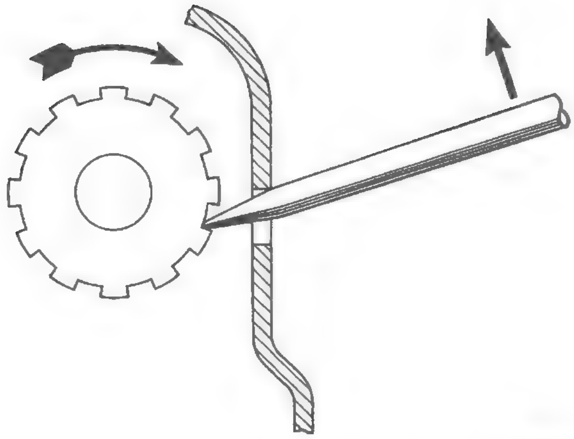
21 BRAKE DRUMS

The front drums (1) are bolted to the inside of the hubs and the rear drums are retained by nuts (2) on the inner ends of the wheel bolts.



Hubs and drums must be removed and installed as assemblies as described in Training Manuals TS 1085 and TS 1086.

To facilitate drum removal, rear brake shoe adjustment may be backed off by rotating adjuster wheel downwards while holding actuating lever out of engagement. Access to adjuster and actuating lever may be gained be removing dust cover in flange plate.



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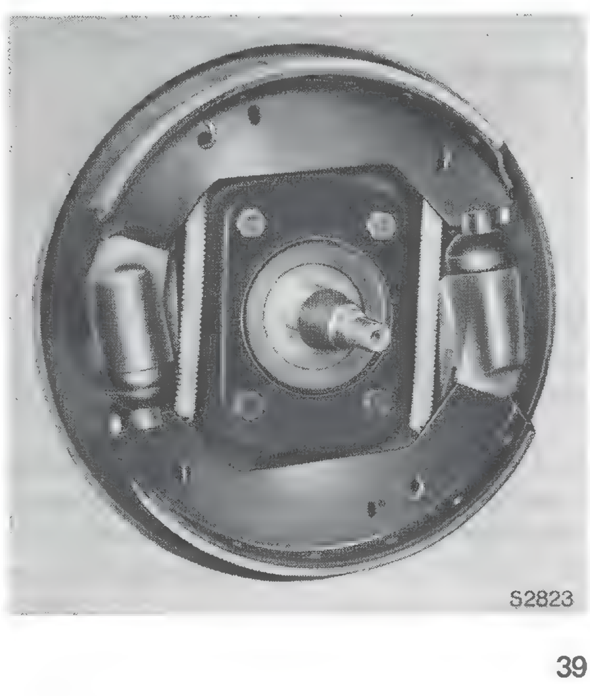
When assembling a new drum to hub ensure mating surfaces are clean and free from damage.

Secure rear drum retaining nuts by staking.

S7216

22 FRONT BRAKE SHOES

The front brakes are of the two-leading-shoe type with fabricated shoes and facings secured by rivets. The shoes are provided with cam-type adjusters and adjustable support screws.



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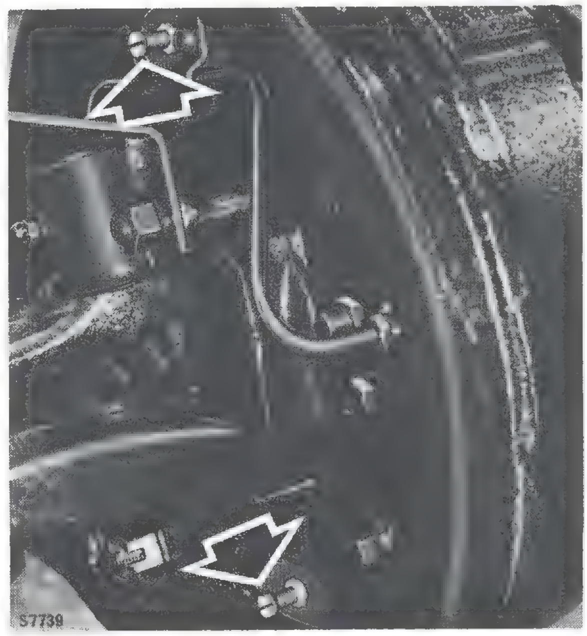
22 FRONT BRAKE SHOES (contd)

Before installing shoes lightly smear end of support screws and abutment ends of shoes with recommended grease.

End of shoe with greater length of exposed flange should be adjacent to brake cylinder piston.

After installing new shoes or facings, support screws should be adjusted. To adjust, back off support screws two turns, adjust shoes hard against drum, and screw supports into flange plate until contact is made with shoe webs. Secure screws with locknuts.

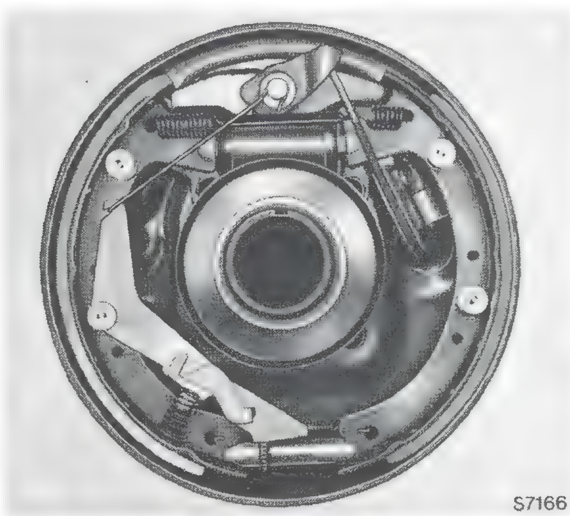


S7739

23 REAR BRAKE SHOES

The self adjusting rear brakes have duo-servo shoe operation through a double-acting hydraulic cylinder.

The upper end of each shoe engages a support pivot and the lower ends locate in an adjustable link connecting the shoes.

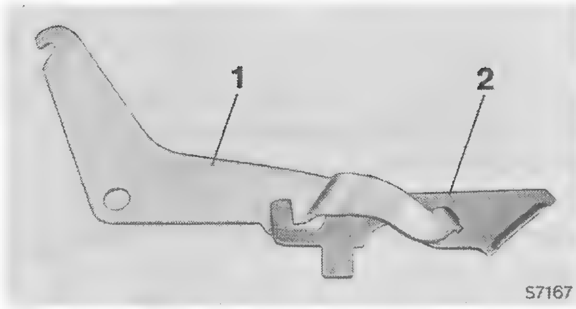


S7166

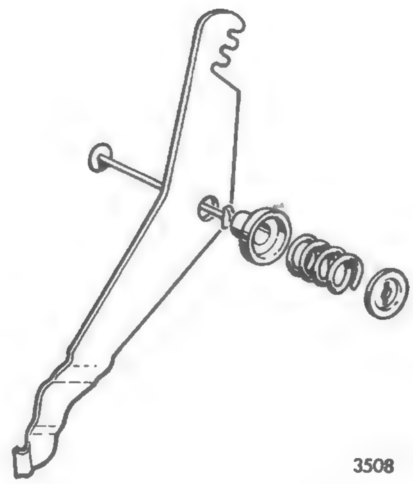
When the brake is applied, the shoes, due to their floating action, are rotated by the drum until the rear shoe fully contacts the support pivot. The rotational force of the front (primary) shoe is then transferred through the adjustable link to the rear (secondary) shoe.

Shoe adjustment is maintained by the adjustable link which has an internal push rod threaded to accept the adjuster wheel. Self adjustment is obtained when the brakes are applied with the vehicle travelling in reverse due to the rear shoe moving away from the support pivot causing the actuating lever to pivot on its mounting and the pawl end of the lever to rotate the adjuster wheel.

The actuating lever (1) can move independently of the pawl end (2) if the load required to turn the star wheel exceeds that exerted by the lever return spring.



Each shoe is held in contact with the flange plate by two spring-loaded retainers, the centre retainer on the secondary shoe being sleeved to support the actuating lever.



No attempt should be made to remove the support pivot.

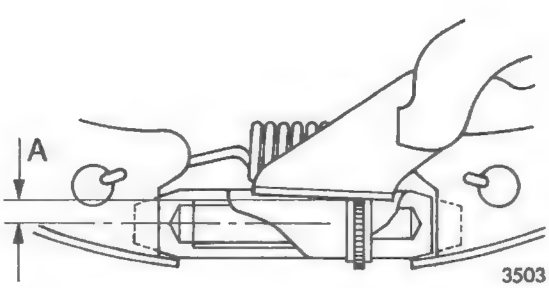
Before installing brake shoes lubricate contact areas on flange plate, support pivot, adjustable link, actuating lever and parking brake quadrant pivot with recommended grease.

Adjuster wheel has a left-hand thread on the right-hand brake and a right-hand thread on the left-hand brake.

When installing shoes ensure primary shoe with shorter facing is nearer front of vehicle.

Install upper spring so that recessed portion adjacent to coils provides clearance for parking brake cable.

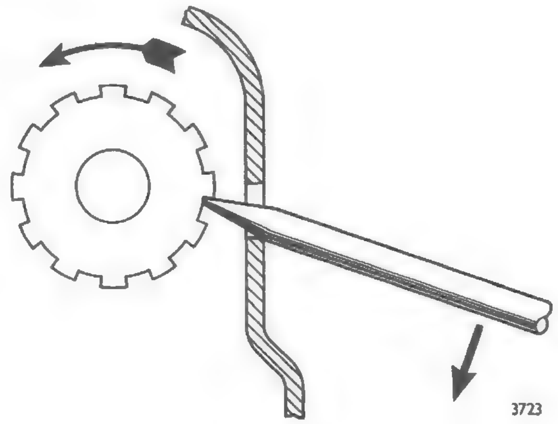
After installing wire link, check position of pawl in relation to adjuster wheel. Distance 'A' between centre line of adjustable link and operating edge of pawl at point of contact with wheel should be 0.26 in. when link is in contact with shoe platform. Distance may be adjusted by locating wire link in alternative notch in actuating lever.



23 REAR BRAKE SHOES (contd)

Initial adjustment of brakes may be carried out by rotating adjuster wheel upwards while holding actuating lever out of engagement. Access to adjuster and actuating lever may be gained by removing dust cover in flange plate.

Finally adjust rear brakes by driving vehicle in reverse and applying brakes several times.



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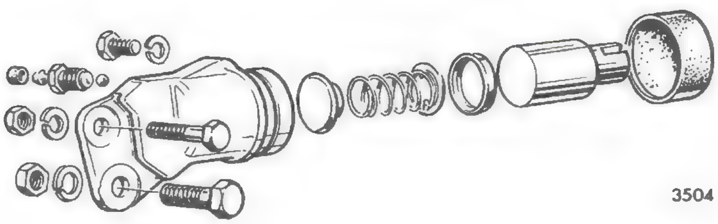
24 FRONT BRAKE CYLINDERS

The front brake cylinders are bolted to the inside of the flange plates and contain a piston and seal, spring and spring retainer. The open end of the cylinder is protected by a dust cover.



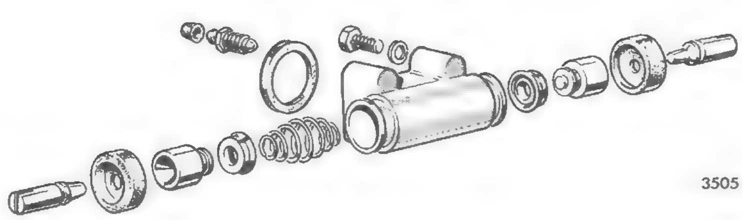
3504

Piston seal lip faces towards flat end of piston.

Pack dust covers with recommended grease before assembly.

25 REAR BRAKE CYLINDERS

The rear brake cylinders are bolted to the inside of the flange plates and contain two opposed pistons and seals separated by a coil spring. The pistons operate short push rods which contact the upper end of the brake shoes.



3505

Piston seal lips face away from recessed end of pistons.

Pack dust covers with recommended grease before assembly.

When installing cylinder locate seal between cylinder and flange plate.

26 STOP LAMP SWITCHES

A stop lamp switch of the spring-loaded plunger type is supported by a bracket attached to the chassis sidemember. The switch is operated by the brake pedal relay lever.

A second stop lamp switch, of similar construction, is operated by the lever on the inner end of the parking brake lever shaft.

Adjustment of switch position is by means of two nuts threaded on switch body. With brake pedal or parking brake lever in off position, adjust position of switch so that contacts just part. At no time should switches be located so that plunger is fully depressed, otherwise brakes may be prevented from releasing.

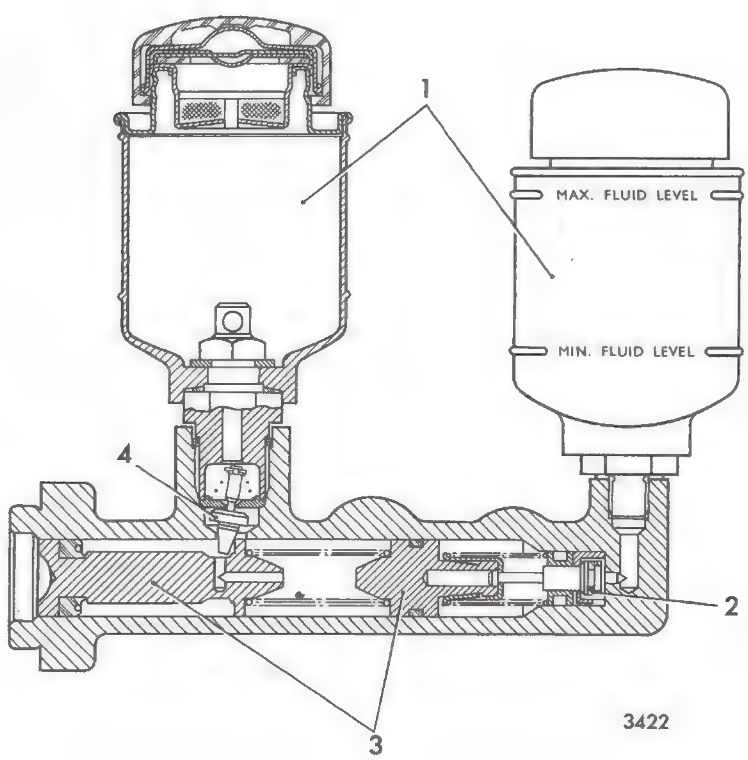
The switches, which are sealed units, must be renewed if defective.

27 MASTER CYLINDER

The hydraulic tandem master cylinder is mounted together with the servo on the chassis front crossmember.

The cylinder contains two spring-loaded pistons (3), each fitted with rubber seals. Two detachable reservoirs (1), each containing a filter are mounted on bosses above the cylinder. A tip-type recuperating valve (4) is incorporated in the rear reservoir boss so that the valve spindle projects into the cylinder bore. The valve is held open by the primary piston flange when the brakes are off and closes under the action of its spring as the piston moves when the brakes are applied.

A centre valve assembly (2), operated by the secondary piston, is located in the forward end of the cylinder.



The front and rear hydraulic brake pipes are screwed into tapped bosses in the side of the cylinder, the rear boss being provided with an adaptor.

Access to reservoir retaining nuts is gained by removing filters.

Recuperating valve is retained by adaptor in rear cylinder boss and must be removed before primary piston can be withdrawn.

Secondary piston and centre valve assembly may be withdrawn after removing stop bolt adjacent to secondary outlet boss.

Centre valve assembly may be separated from secondary piston by lifting spring retainer leaf.

Centre valve is disassembled by compressing spring and disengaging valve stem from slot in spring retainer.

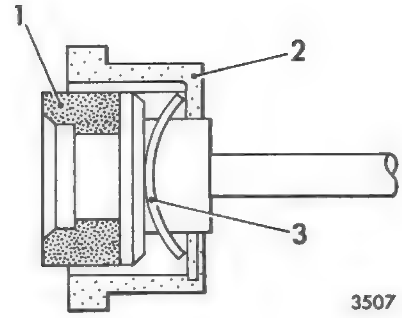
Discard all components which will be replaced from a repair kit.

Examine cylinder bore for wear and corrosion. Visible scores or ridges necessitate renewal of cylinder.

27b MASTER CYLINDER — Reassembly and Installation

Before reassembly smear all components with clean brake fluid.

Install centre valve seal (1) with larger diameter adjacent to end of valve stem, and spring washer (3) with convex side against shoulder. Flat side of valve spacer (2) faces away from valve seal.



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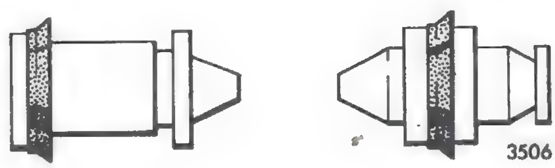
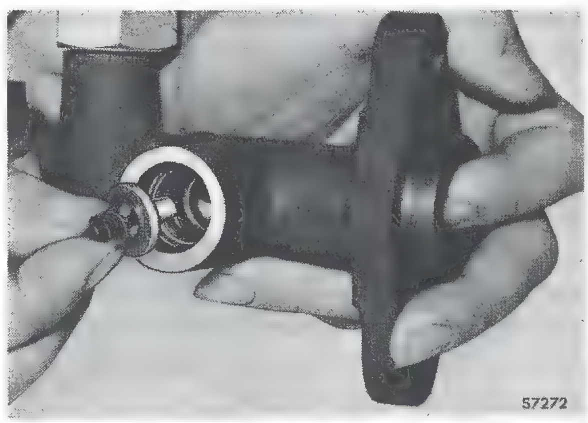
Secondary piston spring has more coils than primary piston spring.

Lip of primary piston seal faces towards tapered end of piston and lip of secondary piston seal towards flanged end of piston. Primary piston is shown on left and secondary piston on right.



3506

Hold primary piston depressed when installing recuperating valve and stop bolt to ensure that valve spindle locates behind piston flange and stop bolt between flanges of spring abutment adjacent to spacer on centre valve.



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Install copper washer between recuperating valve and adaptor.

Pack master cylinder dust cover with recommended grease before assembly.

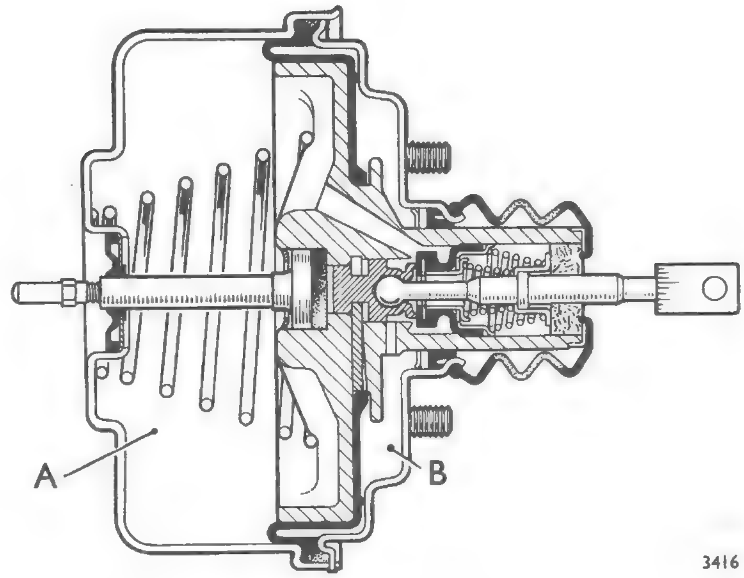
Before installing master cylinder check, and if necessary, adjust length of push rod in servo as described in Section 28c.

28 SUSPENDED-VACUUM SERVO

The suspended-vacuum type servo is a direct-acting unit installed between the brake pedal relay lever and master cylinder. A connection for a vacuum gauge pipe is provided in the servo reservoir.

28 SUSPENDED-VACUUM SERVO (contd)

The movement of the servo push rod is governed by the travel of a valve rod and plunger connected to the foot brake pedal. Servo assistance is gained from the loading exerted on the servo push rod by a piston which supports a rubber rolling-type diaphragm forming two chambers 'A' and 'B' in the servo shell. In the 'brakes off' position, the valve body and diaphragm are held by a spring against the end cover of the servo unit in a state of suspended vacuum created by exhaustion of air through a non-return valve and hose connected to the engine intake manifold or exhauster.



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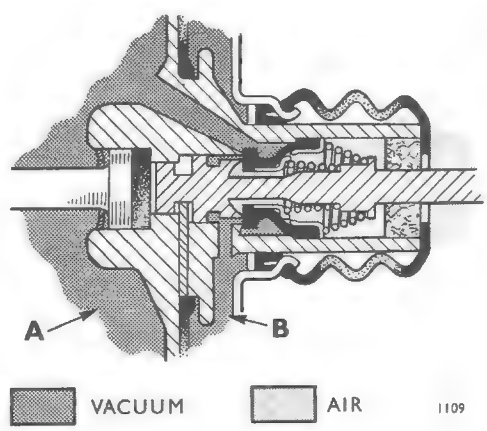
On application of the brake pedal, controlled entry of air at atmospheric pressure to the rear chamber causes the valve body to move the servo push rod, thus operating the master cylinder piston. In the absence of servo assistance due to loss of vacuum, the brakes can still be applied since there will then be direct mechanical action on the servo push rod. With the engine running, and with the servo in the 'brakes off' position, the same degree of vacuum exists in chambers 'A' and 'B' owing to an open interconnecting passage through the valve body.

On partial application of the brake pedal, initial forward movement of the valve rod and plunger allows the spring-loaded rubber air valve to close the vacuum passage between chambers 'A' and 'B'.



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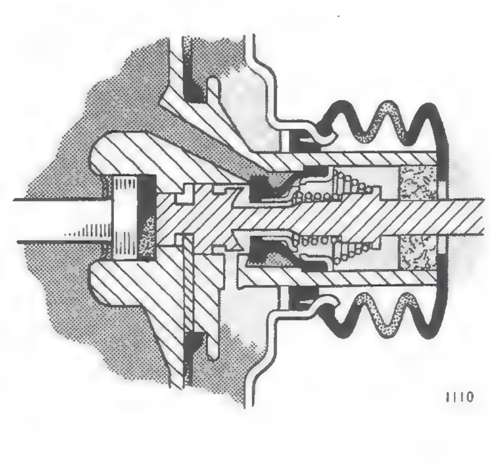
Slight further movement releases the rear seat of the plunger from the face of the valve to admit air at atmospheric pressure to chamber 'B' through the plastic foam filter at the end of the valve body. The difference of pressure in the two chambers causes the valve body, diaphragm and push rod to move forward and bear on the master cylinder piston for actuation of the brakes.



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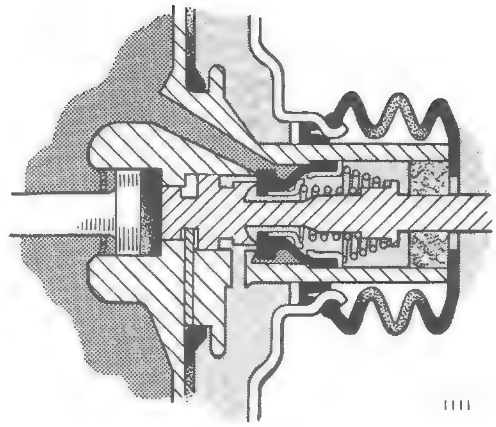
The valve body continues to move forward slightly under the influence of the greater pressure in chamber 'B' until the rim of the rubber reaction disc is compressed by the front shoulder of the valve body against the counter-resistance of the servo push rod. The face of the rubber air valve then meets the rear seat of the plunger to cut off the supply of atmospheric air, trapping pressure created in chamber 'B' but preventing increased servo action. At this stage, the reaction on the disc also equals the force applied by the foot pedal; the servo, therefore, attains a state of balance with the brakes held. If no such control were embodied, the servo action would not be progressive in relation to foot pedal effort and maximum braking would result from even the lightest application of the brakes.



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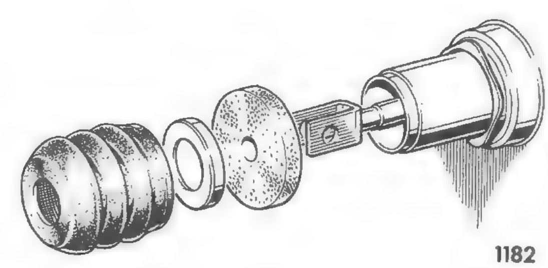
Further application of the brake pedal causes the face of the plunger to compress the rubber reaction disc at its centre to yet again open the air passage to chamber 'B', thus repeating the cycle of operation to give heavier braking. The cycle is virtually instantaneous to the point of maximum foot pressure on the pedal, when full compression of the centre of the rubber reaction disc by the plunger no longer permits the cut-off of atmospheric air to chamber 'B'. The servo will then provide maximum unrestricted assistance.

When pressure on the foot pedal is partially released, the plunger and valve rod move rearwards to permit the rubber air valve to open the vacuum passage between chambers 'A' and 'B', but at the same time preventing further entry of atmospheric air through the valve body. The pressure in chamber 'B' is thereby reduced to allow the valve body, diaphragm and servo push rod to retract under the influence of the large return spring in chamber 'A'. The valve body will stop moving rearwards when a state of balance is again attained in the servo. This occurs as the rear seat of the plunger contacts the face of the rubber air valve to close the vacuum passage between chambers 'A' and 'B'. The brakes are then held partly applied.

If all pressure is removed from foot pedal, the servo returns immediately to a state of rest in the 'brakes off' position. Chamber 'B' will then be exhausted of air, the servo push rod no longer exerts a force on the master cylinder piston, and fluid pressure in the pipe lines to the brakes is released.

28a SUSPENDED-VACUUM SERVO — Air Filter Renewal

Access to filter is gained after pulling back rubber boot from rear of servo and withdrawing filter retainer. Filter must be cut to allow removal and installation over push rod. After installing filter, ensure that retainer is pressed on end of valve bore and rubber boot is located over all five lugs on end cover.



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28b SUSPENDED-VACUUM SERVO – Non-return Valve Renewal

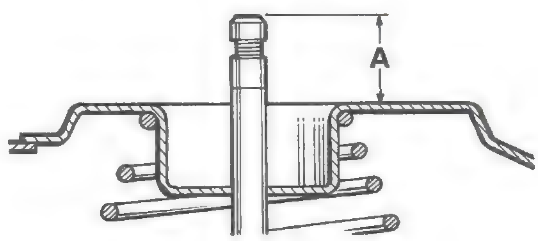
Non-return valve may be removed from reservoir by turning valve a quarter of a turn anti-clockwise.

When installing valve, seal should not be lubricated as difficulty may be experienced in locating seal when tightening valve.

28c SUSPENDED-VACUUM SERVO – Push Rod Setting

To ensure correct clearance between servo push rod and master cylinder primary piston, push rod must protrude 0.10 in. (dimension 'A'), from front face of servo. Protrusion must be checked with vacuum in system and servo in 'brakes off' condition.

Setting is adjusted by turning bolt at front of rod. After adjustment, lock bolt with Loctite Grade B.



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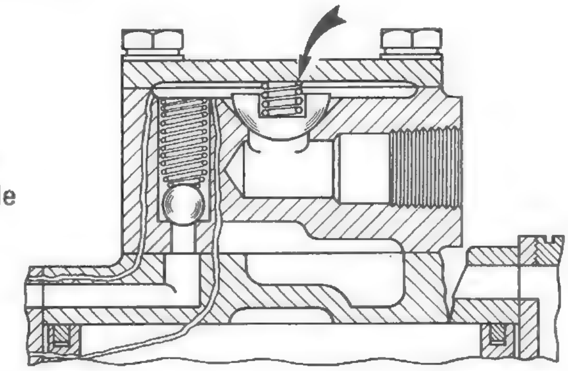
29 EXHAUSTER AND VALVE BODY

The exhauster and valve body are similar to those described in Sections 15 and 16, except for the addition of a spring above the non-return valve. This limits the maximum vacuum obtainable and is necessary because the exhauster is connected directly to the servo without a vacuum reservoir.

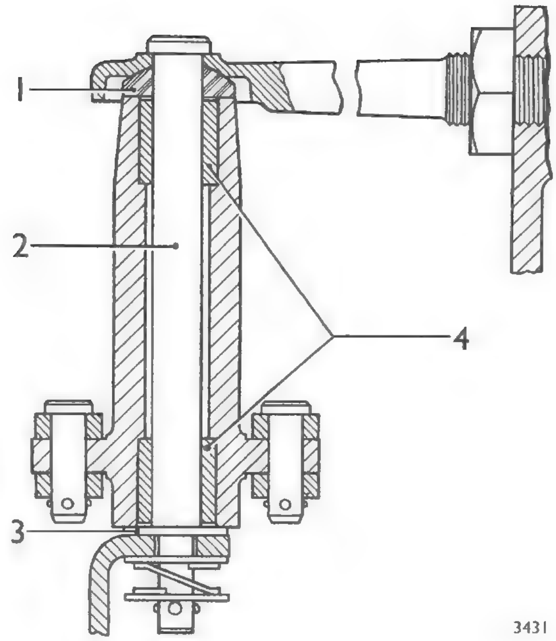


3424

30 PARKING BRAKE LEVER AND LINKAGE

The parking brake lever is mounted on the driver's seat platform and connected by a cable to a vertically-mounted bell crank lever attached to the rear axle housing. Cables connect the bell crank lever to a cam inside each rear brake assembly.

The bell crank lever pivots on a shouldered pin supported by two brackets attached to the axle housing. A rubber cover is interposed between the lever and the upper support bracket and a thrust washer between the lever and the lower bracket. The bushes are of the sintered bronze type.



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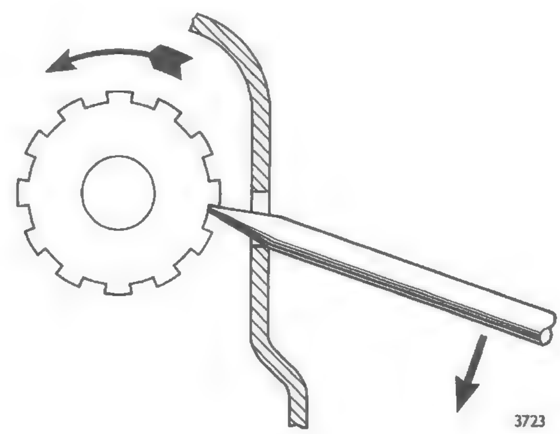
30a PARKING BRAKE LINKAGE – Adjustment

If excessive travel of the parking brake lever exists and operation of the rear brake adjustment mechanism has been verified, the parking brake cables must be reset.

Before adjustment, disconnect cables from parking brake lever, bell crank lever and relay lever and adjust brake shoes into contact with drums by means of adjuster wheel in each rear brake assembly.



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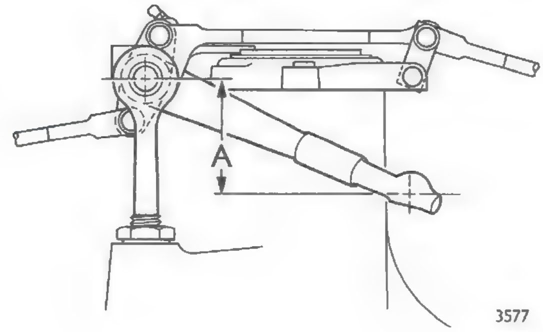
With bell crank lever return spring disconnected, position lever central in slot in lower bracket and adjust length of cables until clevis pins can just be inserted and dimension 'A' is 2.60.



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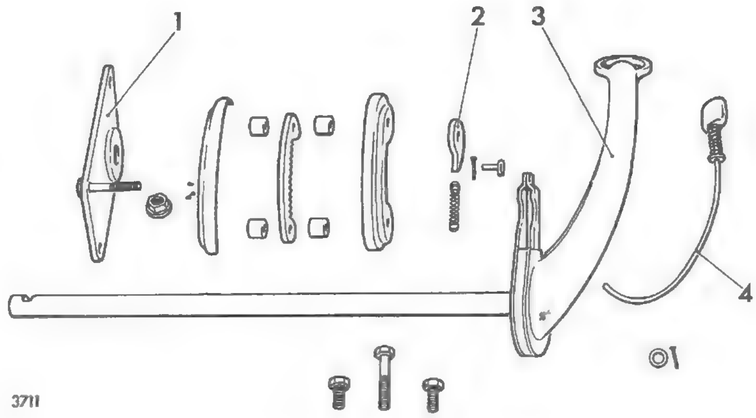
30a PARKING BRAKE LINKAGE – Adjustment (contd)

Before connecting cable to parking brake lever, pull lever on two notches and adjust turnbuckle until clevis pin can just be inserted.

Release parking brake lever and, with bell crank lever return spring attached, back off shoe adjustment until drums are free to rotate.

30b PARKING BRAKE LEVER AND CABLES

The parking brake lever consists of a lever and shaft (3) which pivots in a support (1) attached to the driver's seat platform. The inner end of the shaft is supported by a reinforcement in the cab underbody. The spring-loaded pawl (2) is operated by a rod (4) from a push button in the end of the lever.



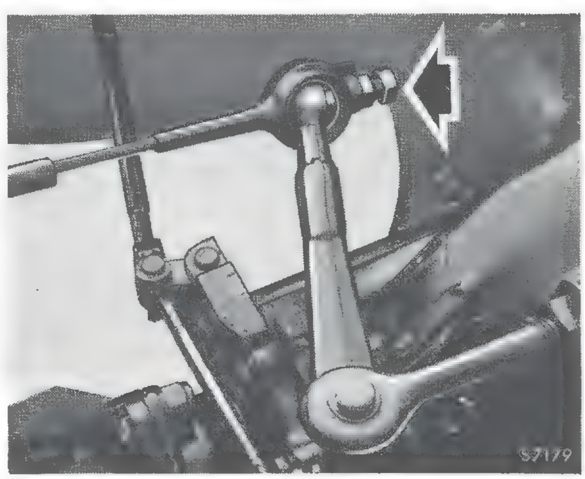
Parking brake lever and shaft may be withdrawn after removing lever from inner end of shaft and bolts securing support bracket to mounting bracket.

Pawl rod button may be unscrewed from rod after removing pawl, spring and rod retaining pin. Withdraw rod from pivot end of lever.

When reassembling lever, locate spacers one each side of ends of sector.

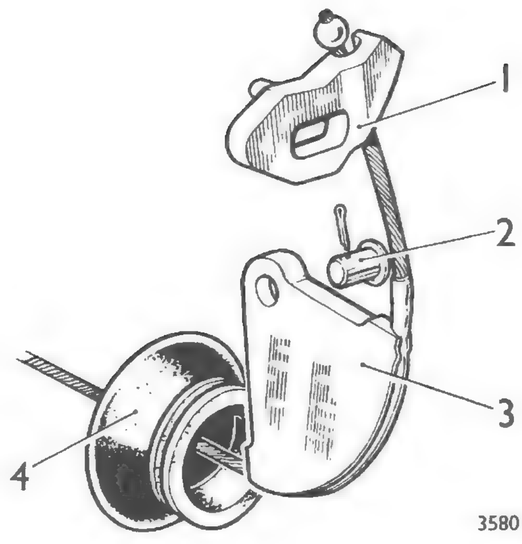
Felt seal on floor panel aperture should be soaked in engine oil before assembly.

When attaching cable to end of bell crank lever, tighten screw fully and slacken a quarter of a turn before securing with locknut.



Renewal of a bell crank lever cable and quadrant assembly necessitates removal of hub and drum.

Quadrant (3) is retained by clevis pin (2) and may be withdrawn after removing dust cover (4) and disconnecting cable from cam (1).



CLAYTON DEWANDRE SUSPENDED-VACUUM SERVO-ASSISTED HYDRAULIC SYSTEM

The service brake operates on the front and rear wheels through a hydraulic system assisted by a Clayton Dewandre suspended-vacuum servo.

The parking brake operates on the rear wheels only through a cable and rods.

The hydraulic brakes are of the leading/trailing shoe type operated by double-acting brake cylinders from a master cylinder mounted with the servo on the chassis frame sidemember.

On gasoline-engined models the servo utilises vacuum developed in the intake manifold. A non-return valve is incorporated in the manifold connection. On diesel-engined models, vacuum is created by an engine-driven exhauster.

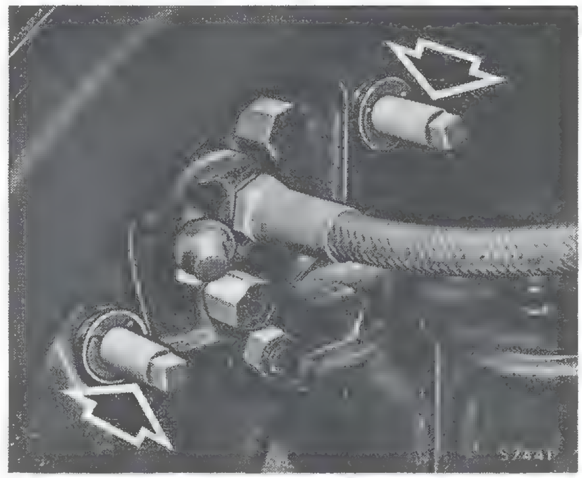
31 BRAKE ADJUSTMENT

Before adjusting the brakes, check and if necessary, adjust the hub bearings.

Check also for excessive wear of the leading shoe facings. These can be examined through the inspection hole in each flange plate.

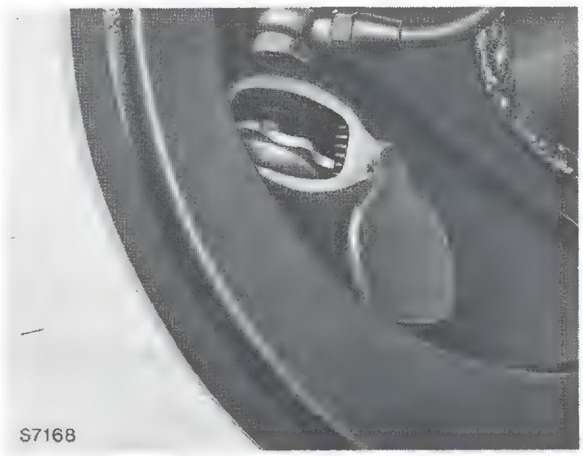
There are two adjusters on each front brake.

To adjust brakes, turn adjusters anti-clockwise until drum is free to rotate, then turn front adjuster clockwise until shoe is hard against drum. Centralize shoe by applying heavy pressure to brake pedal then back off adjuster until shoe is just clear of drum. Repeat operation with rear adjuster.



The single adjuster on each rear brake is protected by a rubber cover.

To adjust brakes turn adjuster forward on left-hand side and rearward on right-hand side until shoes are hard against drum. Centralize shoes by applying heavy pressure to brake pedal and again adjust shoes into contact with drum.



Finally, back off adjuster until shoes are just clear of drum.

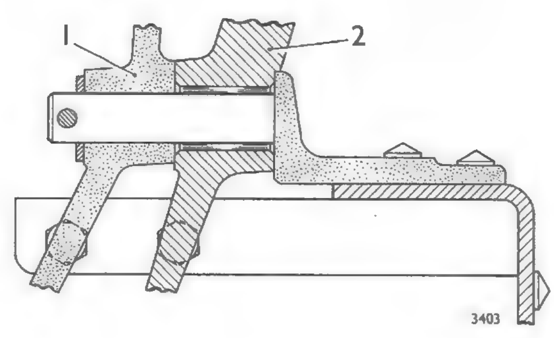
The parking brake is adjusted automatically with the footbrake and normally no other adjustment is required. If there is excessive parking brake lever travel after footbrake adjustment has been completed then parking brake linkage must be adjusted (see Section 46a).

32 BLEEDING THE HYDRAULIC SYSTEM

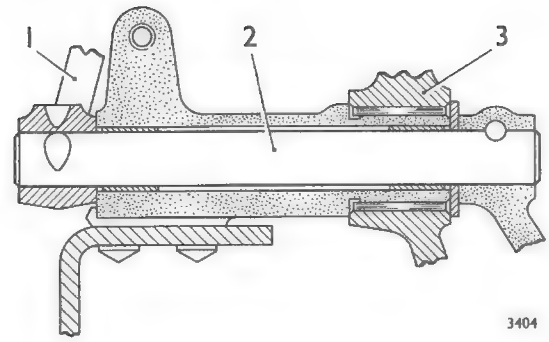
Refer to Section 2.

33 BRAKE PEDAL AND LINKAGE

The brake pedal (2) is mounted on bearing rollers and, on right drive vehicles, is supported together with the clutch pedal (1) on a shaft attached to the chassis frame.



On left drive vehicles the brake pedal (3) pivots on the outside of a bracket which supports the clutch pedal (1) and shaft (2).



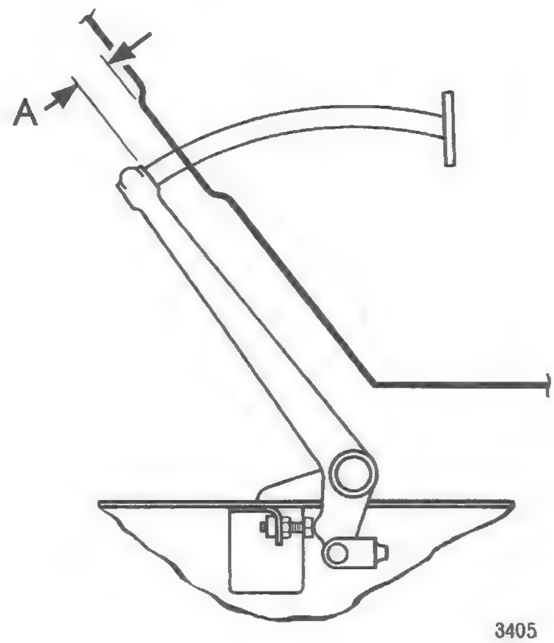
A plate carrying adjustable pedal stop bolts is attached to the chassis frame in front of the pedals.

The relay lever is supported by brackets attached to the chassis frame and pivots on bearing rollers.

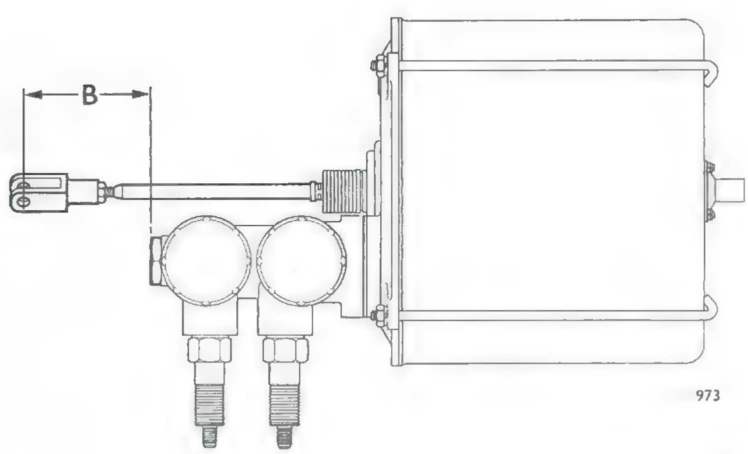
33a BRAKE PEDAL SETTING

It is not usually necessary to alter the brake pedal setting unless the stop bolt has been disturbed or parts of the linkage renewed.

Setting is adjusted by disconnecting push rod clevis from relay lever and adjusting pedal stop bolt until distance 'A' between pedal lever and underside of toe panel is 1.00 in.



Check adjustment of servo pull rod by disconnecting return spring and lightly pulling rod out of servo until resistance is felt. Distance 'B' between front face of master cylinder plug and centre of clevis hole should be 0.30 in.



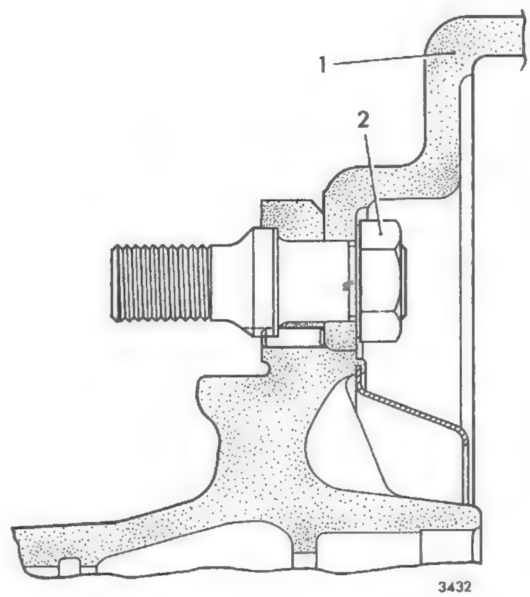
33a BRAKE PEDAL SETTING (contd)

With push rod held forward so that pedal contacts stop bolt and rod pulled lightly out of servo, adjust push rod clevis until pin hole aligns with pin hole in relay lever.

Back off pedal stop bolt one-third of a turn to provide pedal free travel.

34 BRAKE DRUMS

The front drums are bolted to the inside of the hubs and the rear drums (1) are retained by nuts (2) on the inner ends of the wheel bolts.



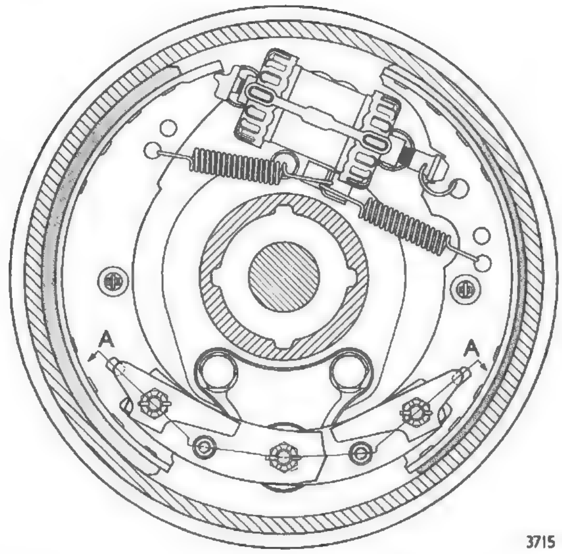
Hubs and drums must be removed and installed as assemblies as described in Training Manuals TS 1085 and TS 1086.

When assembling a new drum to hub, ensure mating surfaces are clean and free from damage.

Secure rear drum retaining nuts by staking.

35 FRONT BRAKE SHOES

The front brakes are similar to those described in Section 5 except that each shoe is provided with a drum-type adjuster and individual pull-off spring.



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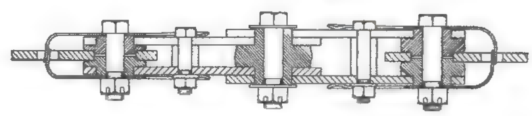
When refacing shoes install shorter rivets in eight holes nearest centre of shoe.

When assembling links to shoes ensure heads of bolts will be adjacent to flange plate when brakes are installed on vehicle.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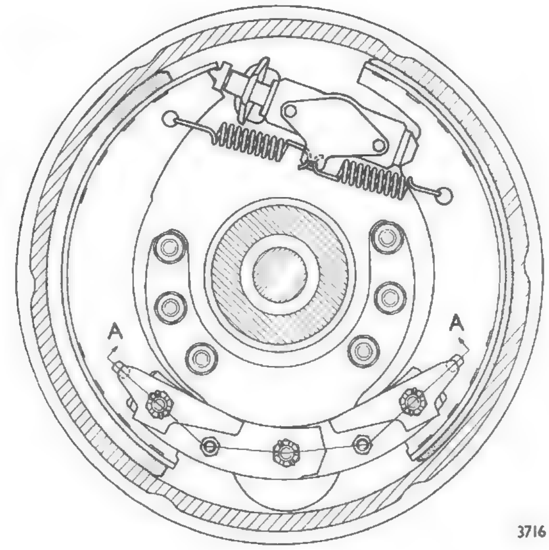
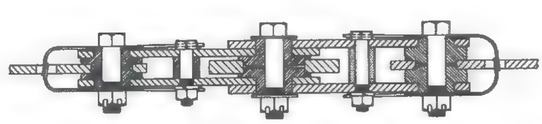
When assembling pull-off springs attach squared end to brake shoe.

36 REAR BRAKE SHOES

The rear brakes are similar to that used with direct-vacuum servo-assisted brakes and the information contained in Section 6 may be applied. When refacing shoes, install shorter rivets in eight holes nearest centre of shoe.

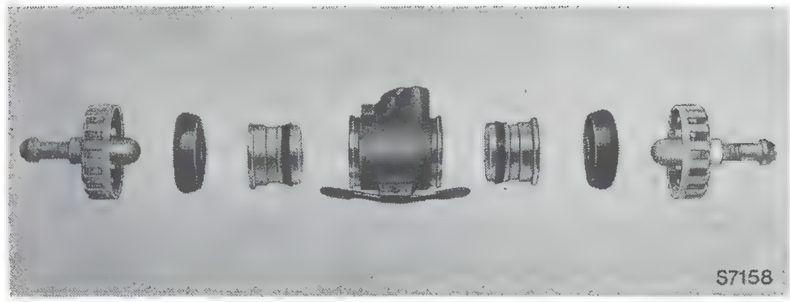


3716


SECTION A-A 3714

37 FRONT BRAKE CYLINDERS

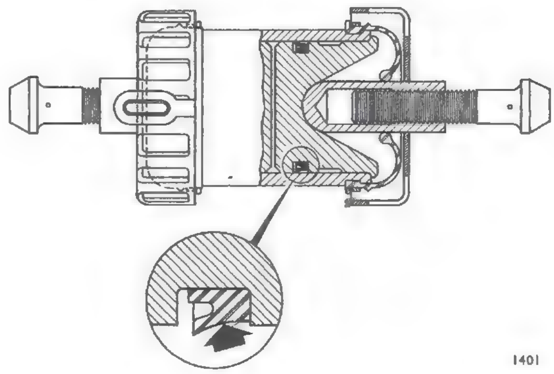
The front brake cylinders, bolted to the inside face of the brake flange plates, contain two opposed pistons fitted with drum-type adjusters actuated from outside the flange plate.


S7158

Seals should be renewed whenever cylinder is disassembled.

Before reassembly smear cylinder bore, seals and pistons with clean brake fluid.

Open side of piston seals face towards flat end of pistons.


1401

38 REAR BRAKE CYLINDERS

Refer to Section 8.

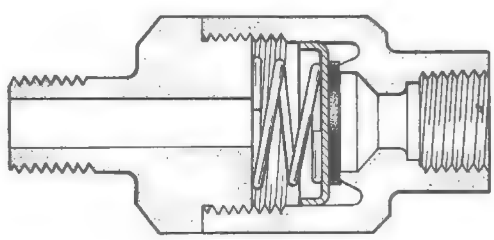
39 REAR BRAKE BISECTORS

Refer to Section 9.

40 NON-RETURN VALVE

A non-return valve is fitted to the intake manifold of gasoline-engined vehicles at the servo vacuum pipe connection.

The valve consists of a body and screw cap containing a rubber-faced valve disc spring-loaded against a valve seat.


3532

When assembling valve, ensure smaller end of tapered spring engages recessed side of valve disc.

41 STOP LAMP SWITCH

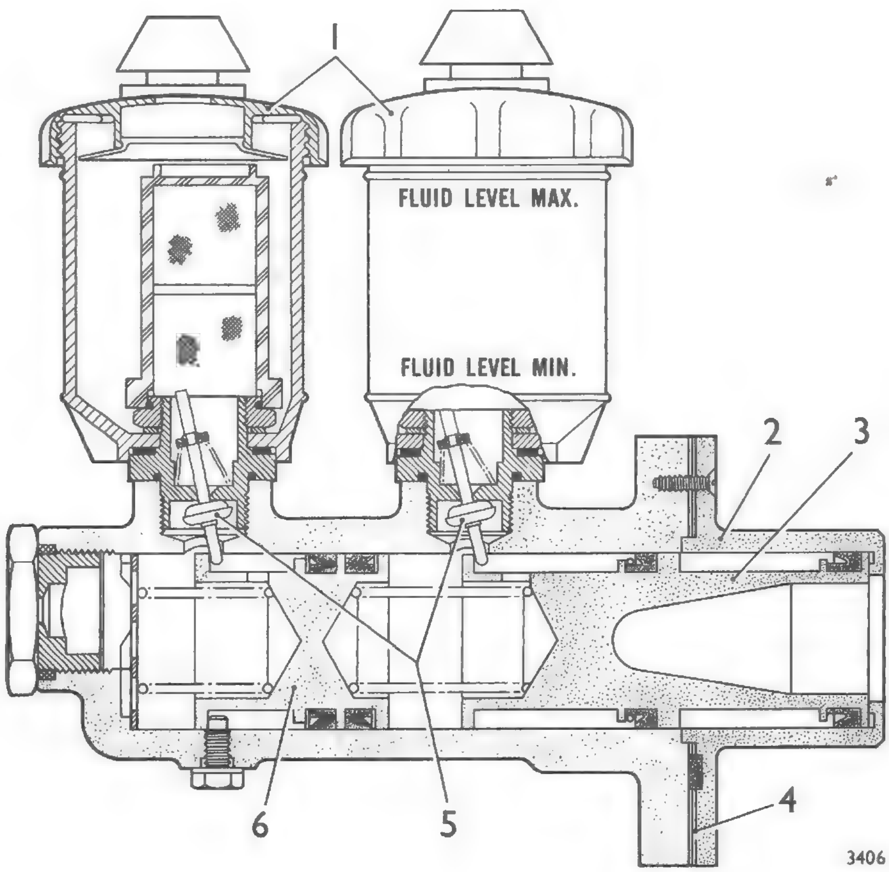
The stop lamp switch, incorporated in the hydraulic brake pipe to the front brakes, is a sealed unit and must be renewed if defective. After renewing switch, bleed hydraulic system.

42 LOW VACUUM WARNING SWITCH

Information concerning the low vacuum warning switch, located in the servo end cover on diesel-engined models, is contained in Section 11.

43 MASTER CYLINDER

The hydraulic tandem master cylinder is mounted together with the servo unit on the chassis sidemember.



The cylinder contains two spring-loaded pistons (3 and 6), each fitted with rubber seals. An extension (2), attached to the flange end of the cylinder incorporates a vent (4), to prevent servo vacuum affecting the cylinder seals. Two detachable plastic reservoirs (1), each containing a filter, are mounted above tip-type recuperating valves (5). The recuperating valves are self-contained and interchangeable, and are screwed into tapped bosses in the cylinder so that the valve spindles project into the cylinder bore. The valves are held open by the piston flanges when the brakes are off and close under the action of their springs as the pistons move when the brakes are applied.

Two adaptors screwed into tapped bosses in the side of the cylinder retain spring-loaded check valves and provide attachment for the front and rear hydraulic brake pipes. The check valves are provided with by-pass holes.

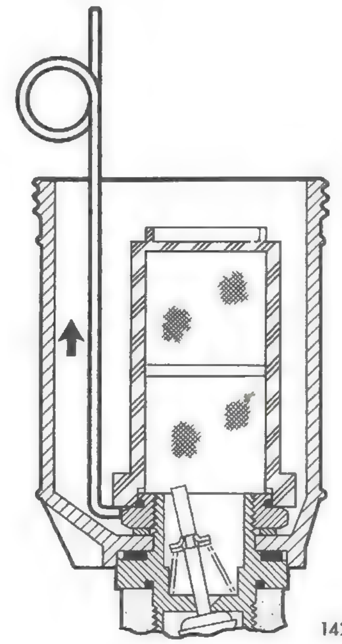
43a MASTER CYLINDER – Removal

To remove master cylinder, it is necessary to remove servo and master cylinder assembly from vehicle.

When separating master cylinder from servo, note number of shims between attaching faces. Shims control clearance between servo push rod and master cylinder primary piston.

43b MASTER CYLINDER – Disassembly and Inspection

Reservoir filters may be removed using a length of welding wire shaped as shown.

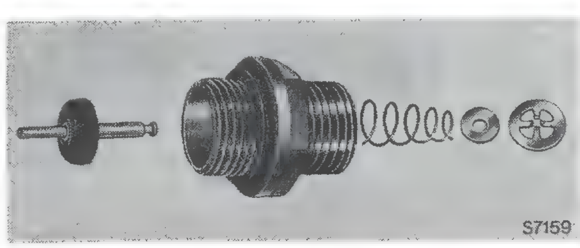


1429

Use Wrench D1142 to remove reservoir retaining nuts.

Recuperating valves must be removed before pistons can be withdrawn.

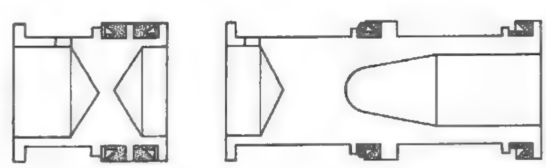
Do not disassemble valves unnecessarily. If required, valves may be disassembled by removing spring retainers.



Pistons may be withdrawn after removal of stop bolt and rear extension.

43c MASTER CYLINDER – Reassembly and Installation

Lips of both seals on primary piston face away from push rod end of piston. Front seal incorporates a garter spring. Lips of seals on secondary piston face away from each other.

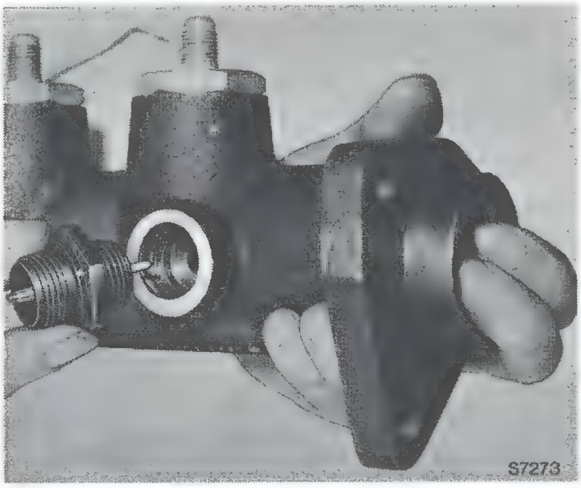


3719

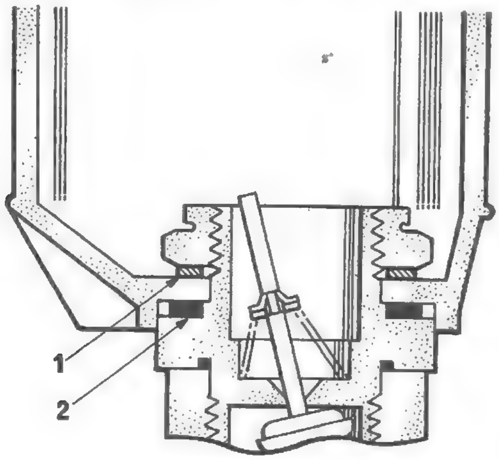
Before installing pistons, place perforated plate in end of cylinder bore.

When installing pistons, smear seals and cylinder bore with clean brake fluid and primary piston rear seal with recommended grease.

When installing recuperating valves and piston stop bolt, hold pistons depressed and check that movement of pistons actuates both valves.



Before installing reservoirs, position rubber washers (2) on recuperating valves and copper washers (1) under reservoir retaining nuts.



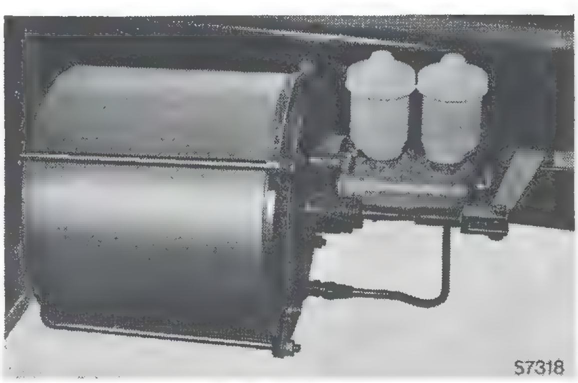
3534

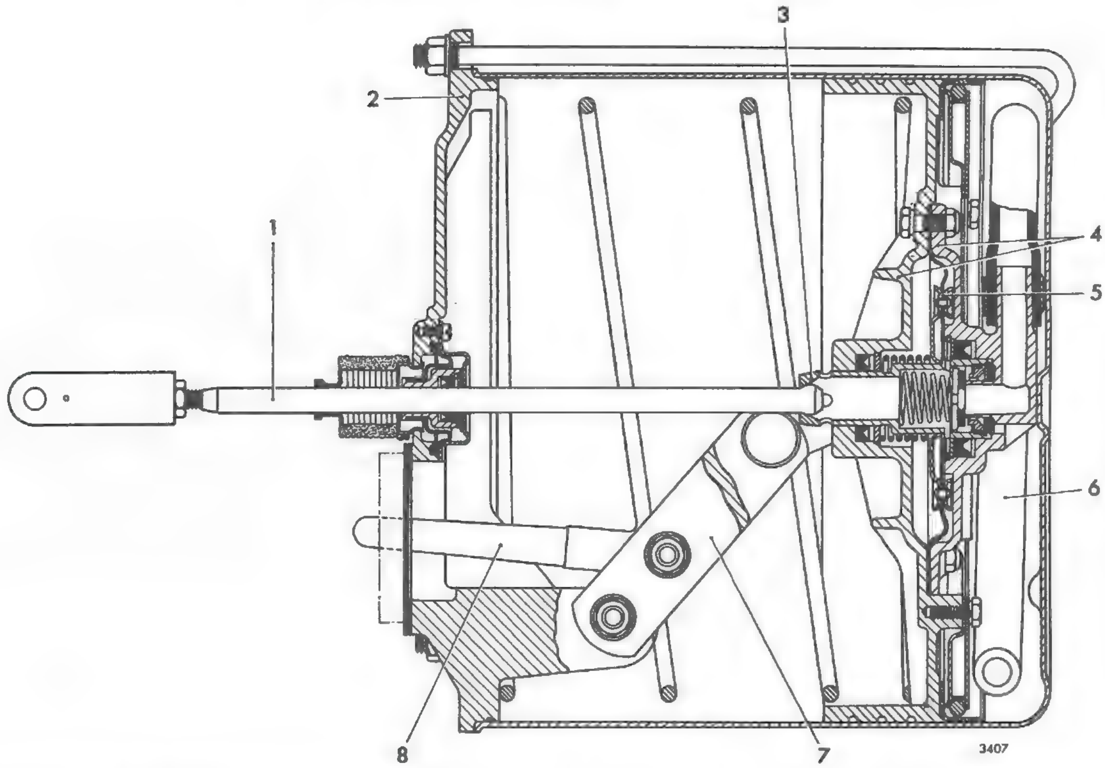
Determine thickness of shims required between master cylinder and servo before installing cylinder. This may be achieved as described in Section 44c.

When installing cylinder on vehicle tighten adaptor nuts to specified torque.

44 SUSPENDED-VACUUM SERVO

The suspended-vacuum type servo is supported by the hydraulic master cylinder mounted on the outside of the chassis sidemember, and linked to the brake pedal via a relay lever.

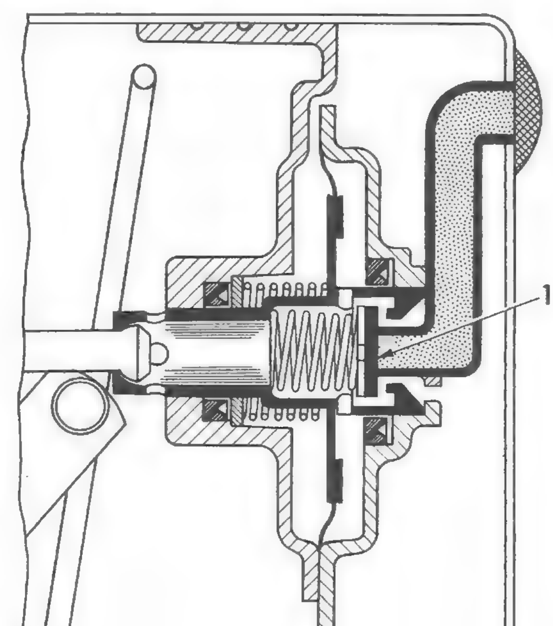




Movement of the servo pull rod (1) is transferred to a valve spring housing (3) riveted to a diaphragm (5) clamped between the two halves of the servo piston (4). The piston is held at the rear of the cylinder by a large diameter return spring, and supported by a link (7) connected to the servo end cover (2). Movement of the link is transferred to the master cylinder through the push rod (8).

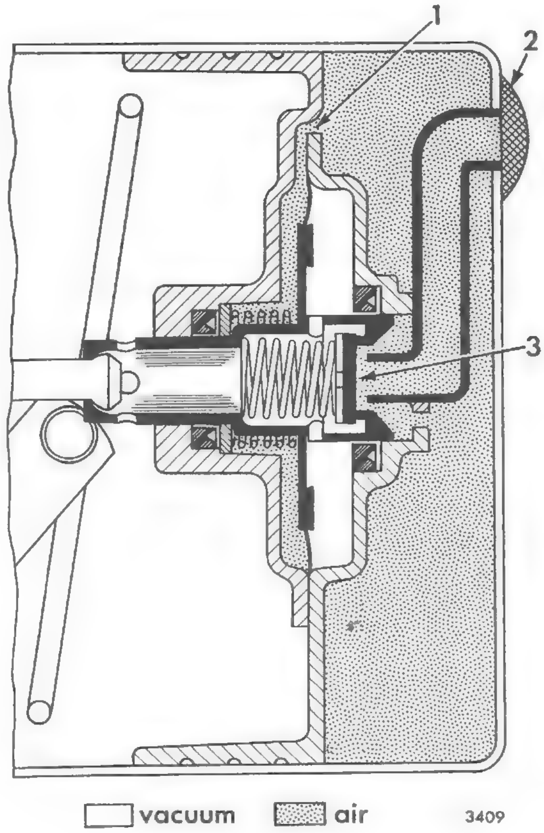
The chambers on each side of the piston diaphragm communicate with the vacuum source through ports in the spring housing and piston back plate. The atmospheric port in the piston back plate is connected to a breather in the end of the cylinder by a rubber hose (6).

In the 'brakes off' position the diaphragm and spring housing assembly is held in the extreme rearward position by the diaphragm return spring and the valve disc (1) closes the atmospheric port. With the engine running, each side of the piston and diaphragm are subjected to the same degree of vacuum.

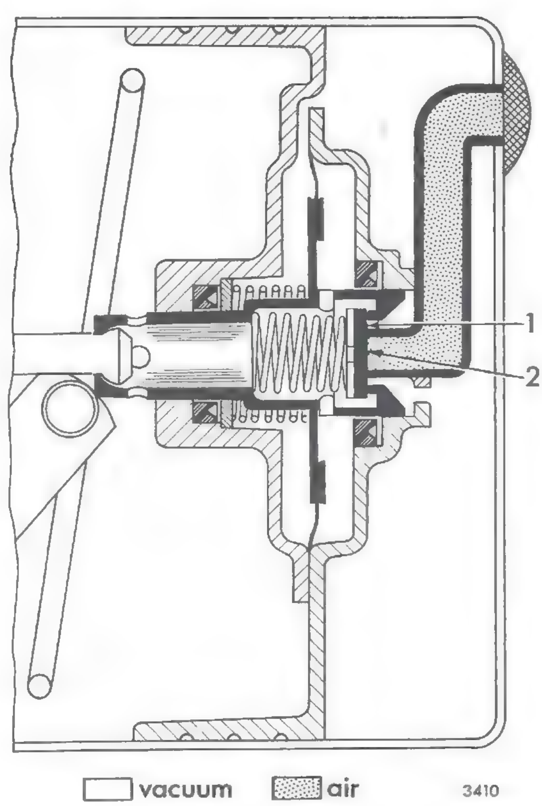


Partial application of the brake pedal causes the diaphragm and spring housing to move against the diaphragm return spring until the vacuum valve seat contacts the valve disc and isolates the chamber at the front of the diaphragm, and the rear side of the piston from the vacuum source.

Further movement of the spring housing lifts the atmospheric valve disc (3) off its seat, allowing air from the breather (2) to enter the cylinder behind the piston, and also the reaction chamber in front of the diaphragm via the transfer port (1) in the piston backplate. The difference in pressure acting on the front and rear faces of the piston cause it to move along the cylinder and augment the effort applied to the brake pedal to operate the master cylinder.



If the brake pedal is held in the 'brakes on' position, atmospheric pressure in the reaction chamber in front of the diaphragm opposes the effort on the servo pull rod and allows the atmospheric valve disc (2) to seat while maintaining contact with the vacuum valve seat (1). This limits the pressure on the piston to a degree proportional to the effort on the pull rod.



When all pressure is removed from the brake pedal the servo piston is returned by its spring and the reaction chambers and cylinder are again subjected to the same degree of vacuum.

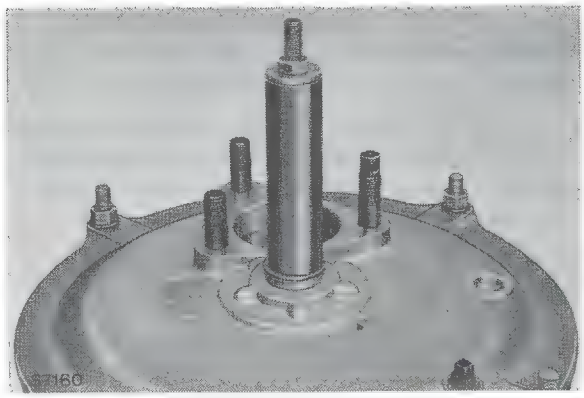
44a SUSPENDED-VACUUM SERVO – Removal

Before removing master cylinder and servo as an assembly, disconnect vacuum pipe, hydraulic pipes, and on diesel-engined models, low vacuum warning switch wire. Disconnect servo pull rod at relay lever.

When removing master cylinder from servo, note number of shims between attaching faces. Shims control clearance between servo push rod and master cylinder primary piston.

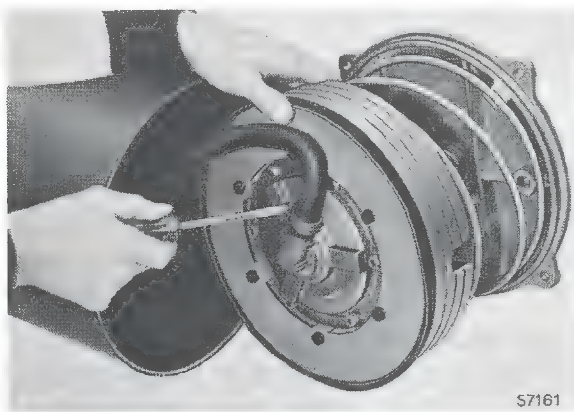
44b SUSPENDED-VACUUM SERVO – Disassembly and Inspection

Before disassembling servo, remove clevis, locknut and gaiter from pull rod and secure a 4 in. length of tube over the rod with plain washers and the clevis locknut. Tighten nut to hold servo piston return spring partially compressed.



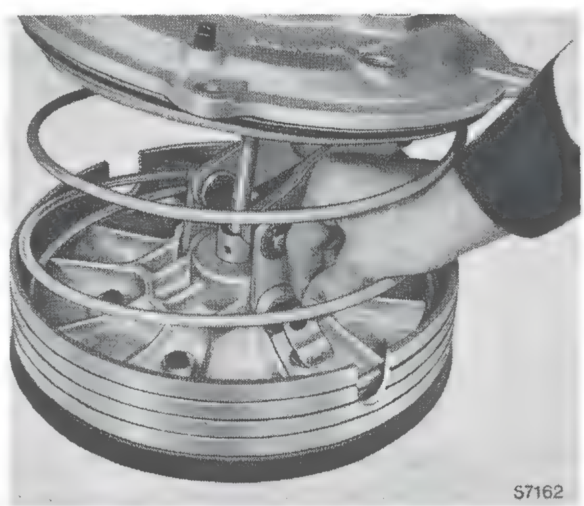
S7160

Before withdrawing piston and end cover assembly, release clip securing atmospheric hose to piston back plate.



S7161

End cover may be separated from piston after withdrawal of link retaining pins. Pins are retained by abutment clips.



S7162

Do not disassemble links and push rod unless excessive wear is evident.

Before removing piston back plate, disassemble piston packing wick retainer, packing plate and packing.

Before piston back plate can be withdrawn it may be necessary to lightly tap end of diaphragm spring housing at front of piston.

Vacuum valve, seat and spring are retained in spring housing by a circlip.

Seal in piston back plate is retained by a washer and circlip.

Ensure that piston packing is soft and pliable and examine atmospheric hose for deterioration and damage. Check that breather in servo cylinder is not obstructed.

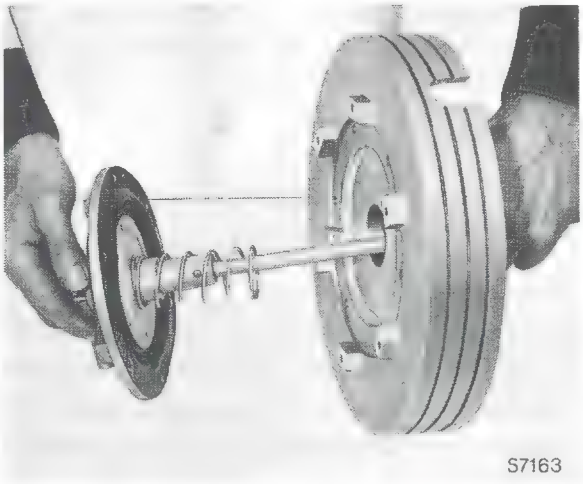
44c SUSPENDED-VACUUM SERVO – Reassembly

Before reassembly, lubricate all seals pivots and friction surfaces with recommended grease. A new piston packing and wick must be soaked in recommended oil before installation.

Install piston seal, closed side first, and back plate seal, open side first. Lip of end cover seal faces outside of cover.

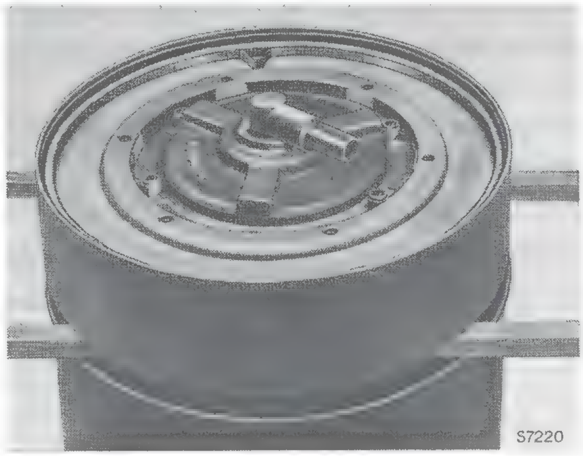
When assembling vacuum valve ensure that chamfered side of valve seat is adjacent to circlip groove in spring housing.

When installing back plate, care must be taken to avoid damage to spring housing. Heads of bolts, and copper washers, should be at front of piston, and plate must be positioned with hose connector approximately 60° anti-clockwise from axis of link pins as viewed from rear of plate.

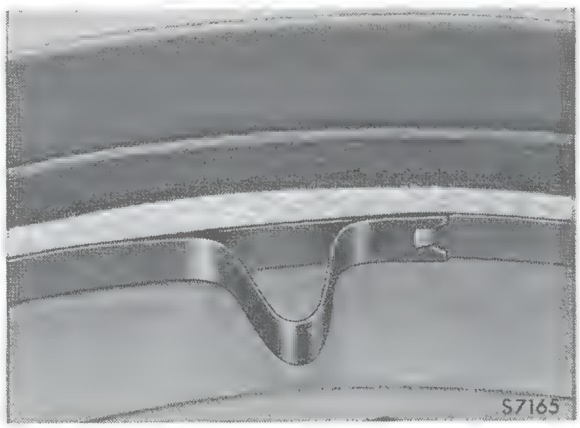


S7163

Concentricity of piston packing during assembly of wick and packing ring is facilitated by use of a close fitting sleeve.

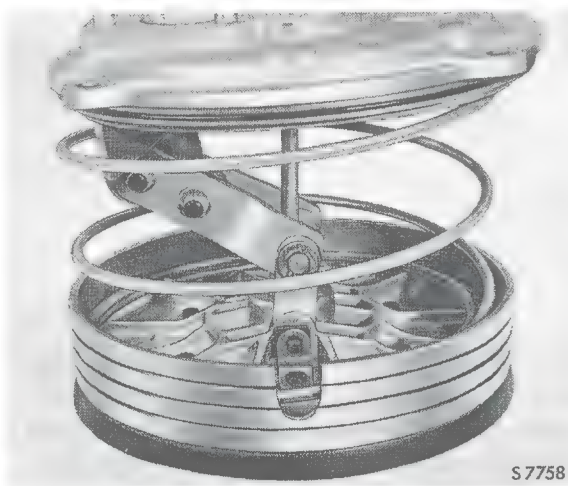


Barbs of packing ring face towards corner of leather packing and ends of ring are connected as shown.



When attaching end cover to piston, connect links so that atmospheric hose connector is diametrically opposite master cylinder attaching flange, and ensure ends of piston return spring are located over lugs on piston and cover.

Retain piston return spring in a partially compressed condition, with links in correct position, using a tube over pull rod as described under disassembly.



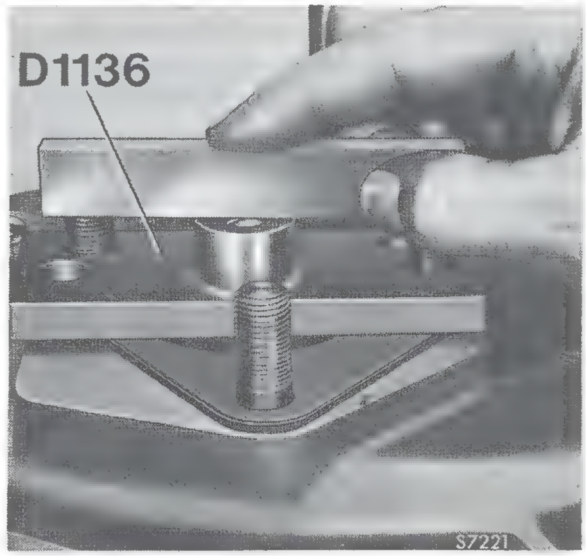
Before installing piston, smear cylinder bore with recommended oil. Position atmospheric hose clips so that screws will not foul cylinder or restrict full piston movement.

When installing piston, align vacuum connection in end cover with breather at rear of cylinder, to ensure atmospheric hose encircles cylinder and is not pinched when piston is at the end of its stroke.

Tighten cylinder retaining bolts evenly to specified torque. Overtightening will distort ends of bolts.

Before installing master cylinder, determine thickness of shims required between cylinder and servo to provide correct clearance between servo push rod and master cylinder primary piston.

To determine thickness of shims, use Gauge D1136 and add shims until push rod is flush with, or not more than 0.005 in. below gauge, when shims are compressed by securing gauge with two nuts. Increase total thickness of shims by 0.020 in.



When installing master cylinder use a new gasket between shims and servo.

45 EXHAUSTER AND VALVE BODY

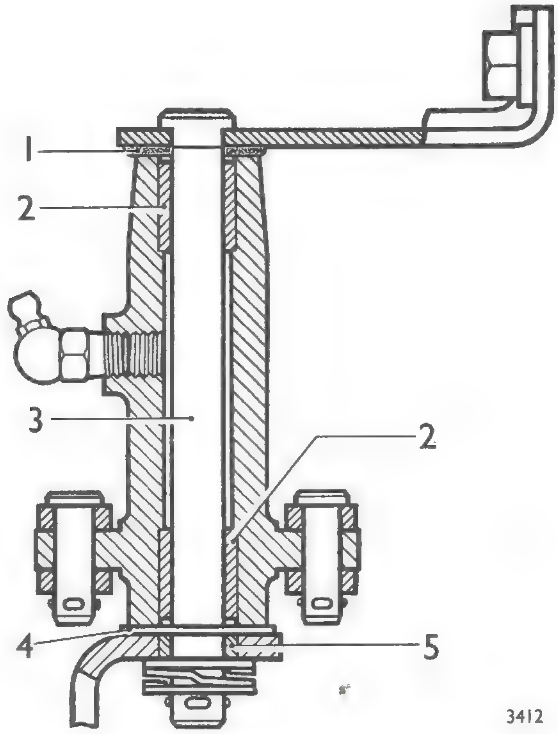
Refer to Sections 15 and 16.

46 PARKING BRAKE LEVER AND LINKAGE

The parking brake lever is bolted to a bracket attached to the chassis crossmember, and positioned between the driver and passenger seats.

A cable connects the lever to a vertically mounted bell crank lever attached to the rear axle housing. Rods connect the bell crank lever to the rear brake cylinders.

The bell crank lever pivots on a pin (3) supported by two brackets attached to the axle housing. A rubber seal (1) is interposed between the lever and the upper support bracket and a thrust washer (4) between the lever and the lower bracket. The lever bushes (2) are of the sintered-bronze type and a bearing (5) is located in the lower bracket.



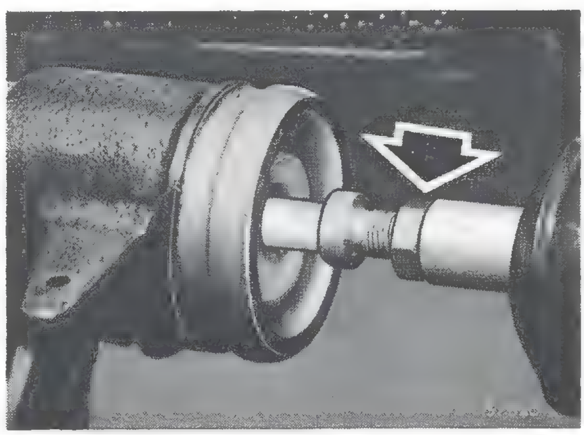
3412

46a PARKING BRAKE LINKAGE—Adjustment

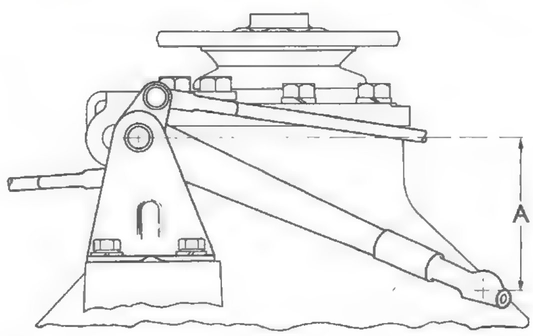
If excessive travel of the parking brake lever exists after the footbrake has been adjusted, the linkage must be reset.

Before setting linkage, adjust rear brake shoes into hard contact with drums.

Parking brake cable must be disconnected at brake lever and bell crank lever rod locknuts slackened. Rod locknut is exposed by sliding brake cylinder boots along rods after disconnecting rod return springs.

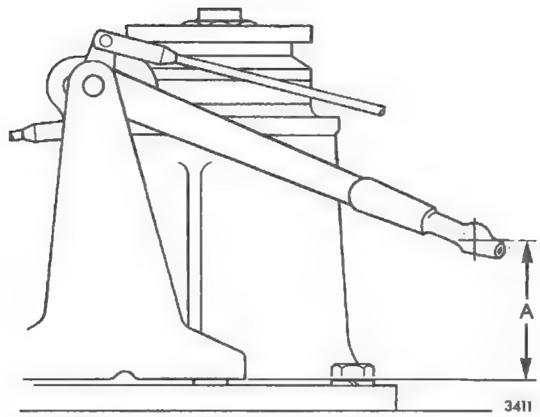


After disconnecting rods from bell crank lever, position lever centrally in slot of lower bracket and adjust length of rods until clevis pins can be inserted and dimension 'A' is 2.22 in. on Models CON and COQ with a single-speed axle. On Model COM dimension 'A' is 2.60 in.



976

On vehicles with a two-speed axle, dimension 'A' is 3.03 in.



When adjusting length of rods, eliminate free travel in brake cylinder link by pulling rod away from cylinder.

Adjust cable clevis until slack in cable is equal to half the diameter of clevis hole.

When installing brake cylinder boots ensure ventilation hole is at bottom.

46b PARKING BRAKE LEVER AND CABLE

Refer to Section 17b.

AIR PRESSURE SERVO-ASSISTED HYDRAULIC SYSTEM

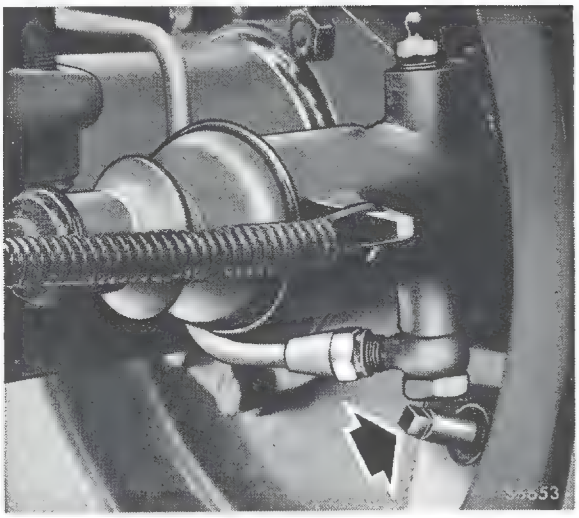
The service brake operates on the front and rear wheels through a hydraulic system assisted by a Clayton Dewandre air pressure servo.

The parking brake operates on the rear wheels only, through cables and rods.

The hydraulic brakes are of the leading/trailing shoe type operated by double-acting cylinders from a master cylinder mounted with the servo on the chassis frame sidemember.

The servo utilises air pressure developed by a single-cylinder engine-driven compressor. A compressor governor valve and a safety valve are incorporated in the system.

47 BRAKE ADJUSTMENT



Footbrake adjustment is as described in Section 31 except that a slotted drum type adjuster actuated by a sprocket attached to a square headed spindle is used on the rear brakes of Model COQ. Clockwise rotation of the spindle expands the brake shoes.

48 BLEEDING THE HYDRAULIC SYSTEM

Bleeding the hydraulic system is as described in Section 2 except that brake adjustment need not be disturbed. Air pressure must be exhausted from servo.

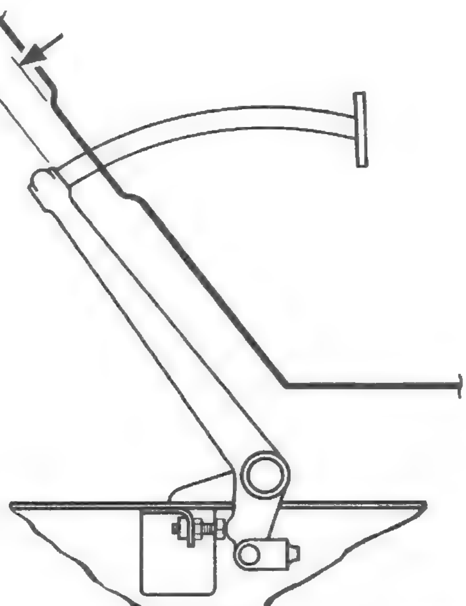
49 BRAKE PEDAL AND LINKAGE

The brake pedal and linkage is as described in Section 33.

49a BRAKE PEDAL SETTING

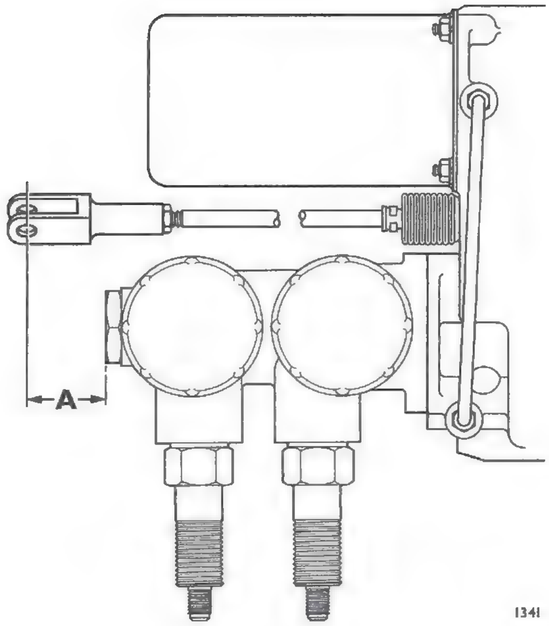
It is not usually necessary to alter the brake pedal setting unless the stop bolt has been disturbed or parts of the linkage renewed.

Setting is adjusted by disconnecting push rod clevis from relay lever and adjusting pedal stop bolt until distance 'A' between pedal lever and underside of toe panel is 1.00 in.



3405

Check adjustment of servo pull rod by disconnecting return spring and lightly pulling rod out of servo until resistance is felt. Distance 'A' between front face of master cylinder plug and centre of clevis hole should be 0.80 in.



1341

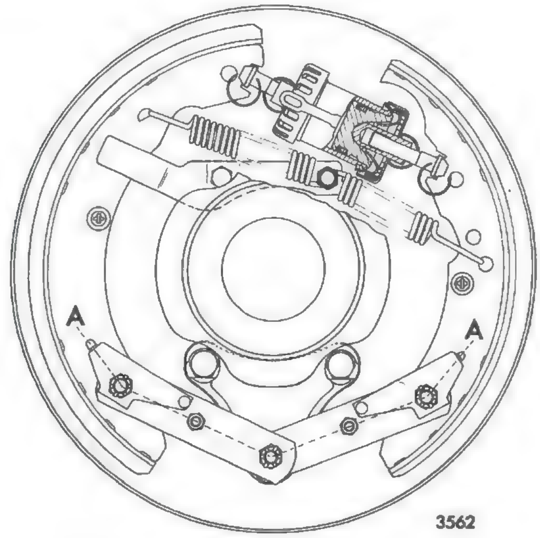
With push rod held forward so that pedal contacts stop bolt and rod pulled lightly out of servo, adjust push rod clevis until pin hole aligns with pin hole in relay lever.

50 BRAKE DRUMS

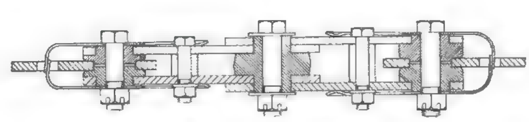
Refer to Section 34.

51 FRONT BRAKE SHOES

The front brakes are similar to that described in Section 5 except that each shoe is provided with a drum-type adjuster and individual pull-off spring.



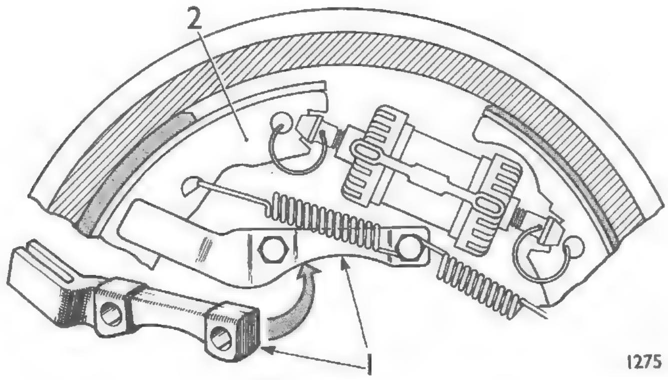
3562



SECTION A-A

3712

The leading shoe (2) on Model COQ is provided with a support (1).

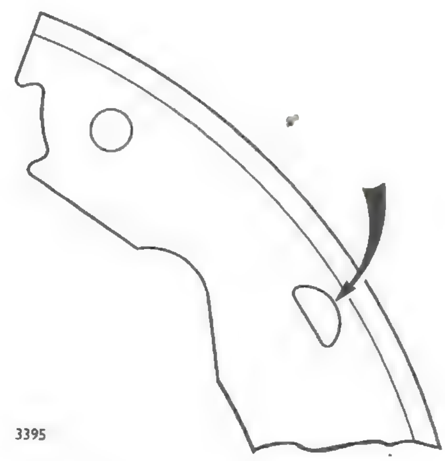


1275

When refacing shoes install shorter rivets in eight holes nearest centre of shoe.

When assembling pull-off springs attach squared end to brake shoe and ensure longer spring is attached to leading shoe.

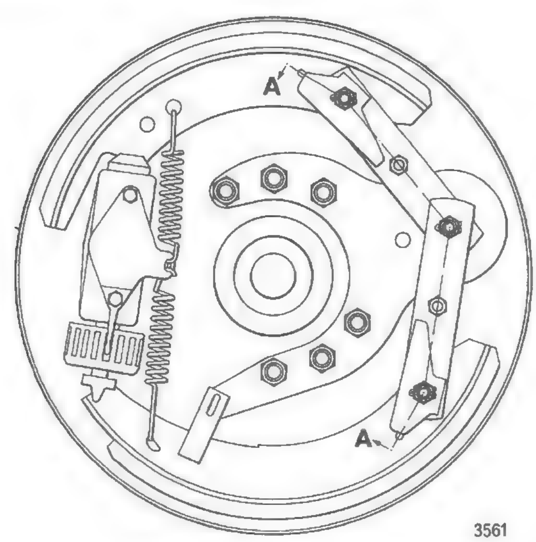
Pull-off spring attaching hole in leading shoes on Model COQ is D-shaped.



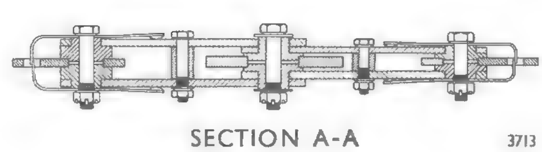
3395

52 REAR BRAKE SHOES

The rear brakes are similar to that used with direct-vacuum servo-assisted brakes and the information contained in Section 6 may be applied with the following additions.

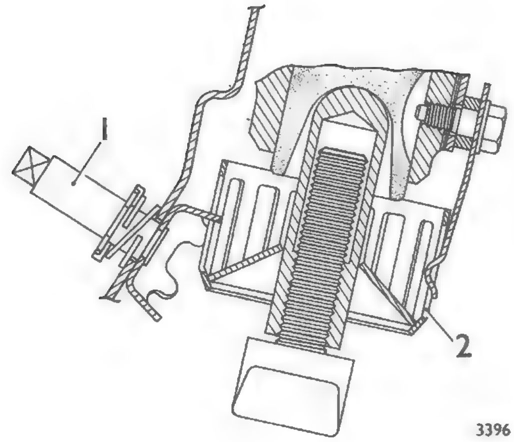


3561



SECTION A-A 3713

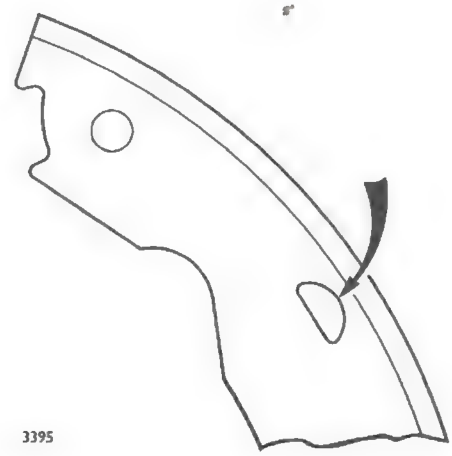
On Model COQ the drum-type brake shoe adjusters (2) are actuated by a sprocket attached to a square-headed spindle (1).



3396

When refacing shoes, install shorter rivets in eight holes nearest centre of shoe.

When installing shoe pull-off springs on Model COQ, attach spring to D-shaped hole in leading shoe.



3395

53 FRONT BRAKE CYLINDERS

Refer to Section 37.

54 REAR BRAKE CYLINDERS

Refer to Section 8.

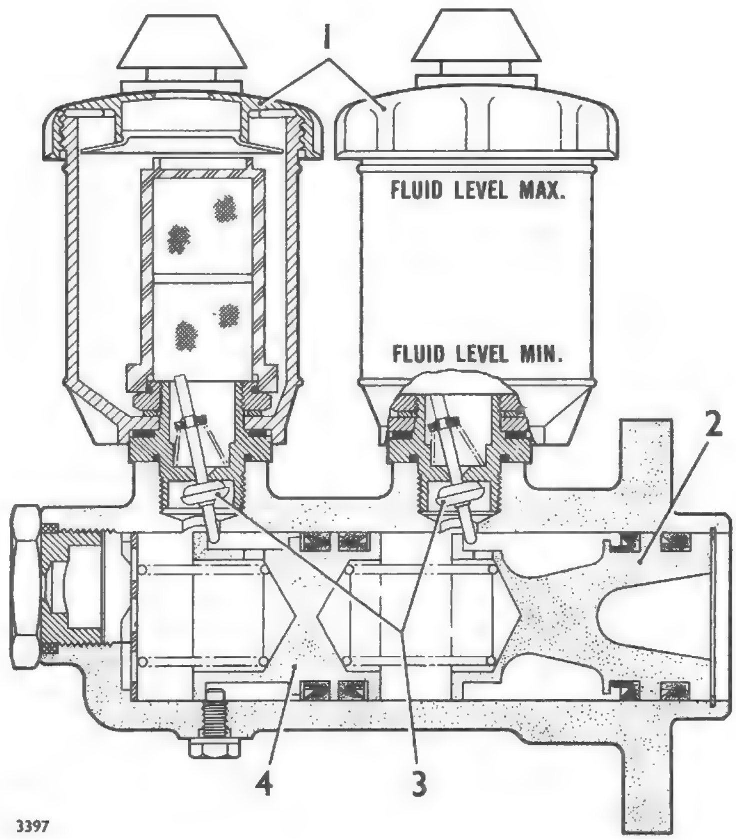
55 REAR BRAKE BISECTORS

Refer to Section 9.

56 MASTER CYLINDER

The hydraulic tandem master cylinder is mounted together with the servo unit on the chassis sidemember.

The cylinder contains two spring-loaded pistons (2 and 4), each fitted with rubber seals. Two detachable plastic reservoirs (1), each containing a filter, are mounted above tip-type recuperating valves (3). The recuperating valves are self-contained and interchangeable, and are screwed into tapped bosses in the cylinder so that the valve spindles project into the cylinder bore. The valves are held open by the piston flanges when the brakes are off and close under the action of their springs as the pistons move when the brakes are applied.



3397

Two adaptors screwed into tapped bosses in the side of the cylinder retain spring-loaded check valves and provide attachment for the front and rear hydraulic brake pipes. The check valves are provided with by-pass holes.

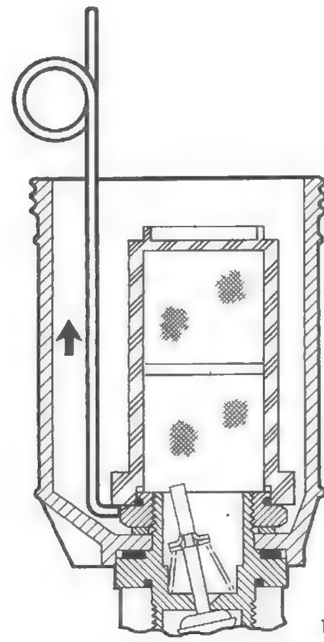
56a MASTER CYLINDER – Removal

To remove master cylinder, it is necessary to remove servo and master cylinder assembly from vehicle.

When separating master cylinder from servo note number of shims between attaching faces. Shims control clearance between servo push rod and master cylinder primary piston.

56b MASTER CYLINDER – Disassembly and Inspection

Reservoir filters may be removed using a length of welding wire shaped as shown.

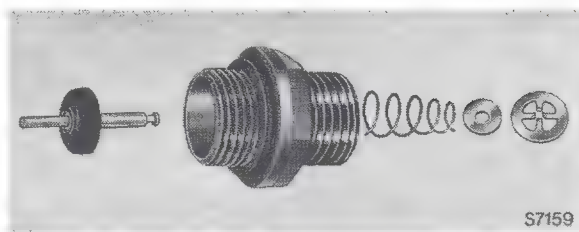


1429

Use Wrench D1142 to remove reservoir retaining nuts.

Recuperating valves must be removed before pistons can be withdrawn.

Do not disassemble valves unnecessarily. If required, valves may be disassembled by removing spring retainers.



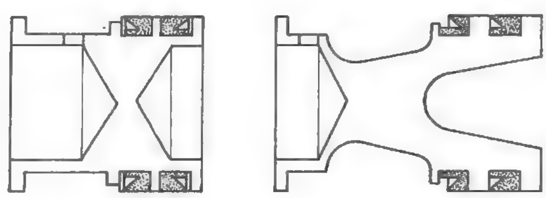
S7159

Pistons may be withdrawn after removal of stop bolt and circlip.

Use a thin feeler blade to assist seals in passing over circlip groove.

56c MASTER CYLINDER – Reassembly and Installation

Lips of both seals on primary piston face away from push rod end of piston.
Lips of seals on secondary piston face away from each other.



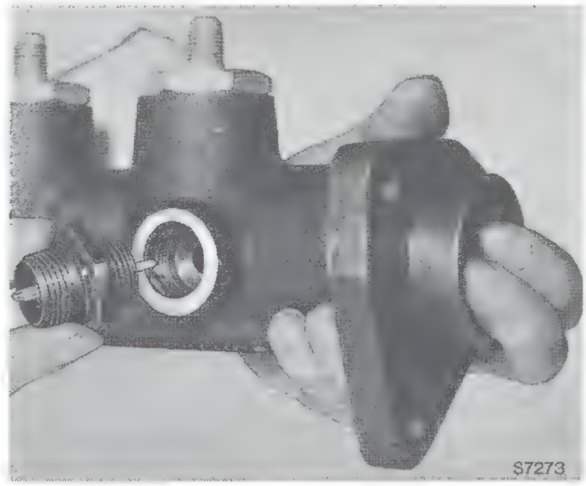
3533

Before installing pistons, place perforated plate in end of cylinder bore.

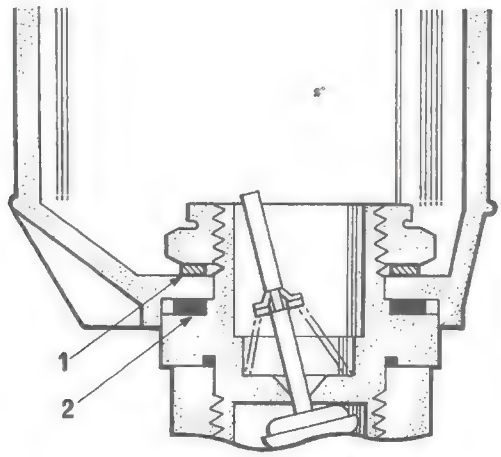
When installing pistons, smear seals and cylinder bore with clean brake fluid and primary piston rear seal with recommended grease.

Use a thin feeler blade to assist seals in passing over circlip groove.

When installing recuperating valves and piston stop bolt hold pistons depressed and check that movement of pistons actuates both valves.



Before installing reservoirs, position rubber washers (2) on recuperating valves and copper washers (1) under reservoir retaining nuts.



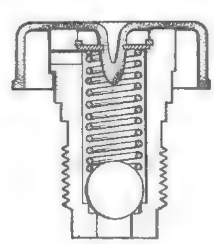
3534

Determine thickness of shims required between master cylinder and servo before installing cylinder. This may be achieved as described in Section 61d.

When installing cylinder on vehicle tighten adaptor nuts to specified torque.

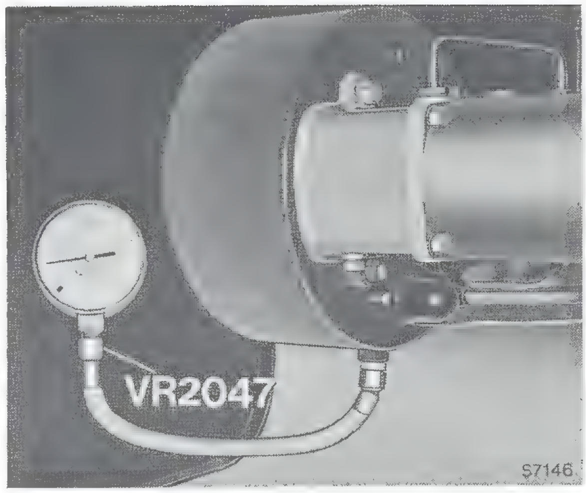
57 SAFETY VALVE

A safety valve, located in the servo reservoir, protects the air system against excessive pressure in the event of governor valve failure. The valve is non-adjustable and consists of a body containing a spring-loaded ball check-valve retained by a washer and circlip. A dust cover is fitted over the valve body.



3530

Operation of safety valve may be checked by disconnecting air line to governor valve at servo and installing a plug in servo connection. Install Gauge VR2047 in reservoir drain plug boss, charge system, and note pressure at which safety valve operates.



If valve fails to release air at specified pressure remove and clean valve. If valve still fails to operate, renew valve.

Safety valve may be checked for leakage by fully charging system and smearing valve with soap solution. If leakage exceeds a one inch soap bubble in five seconds renew valve.

58 STOP LAMP SWITCH

The stop lamp switch, incorporated in the hydraulic brake pipe to the front brakes, is a sealed unit and must be renewed if defective. After renewing switch, bleed hydraulic system.

59 LOW AIR PRESSURE WARNING SWITCH

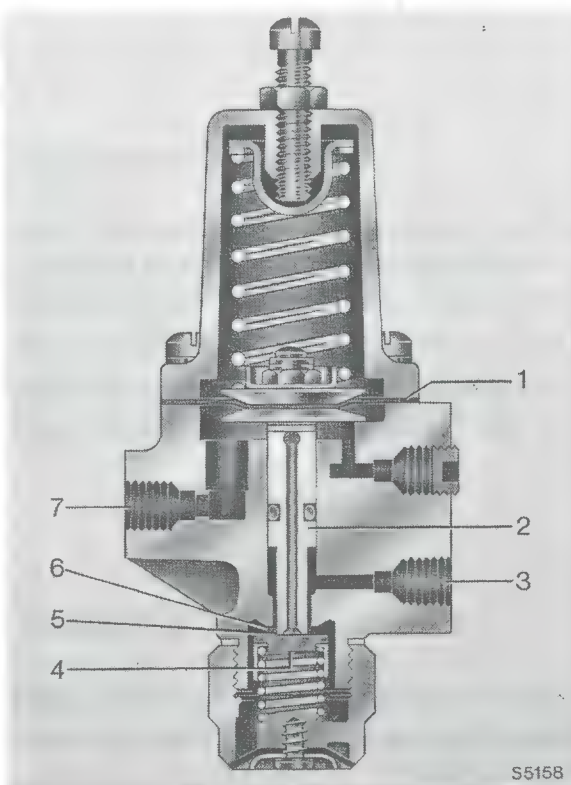
Refer to Section 214.

60 COMPRESSOR GOVERNOR VALVE

The output of the compressor is controlled by a diaphragm-type governor valve mounted on the chassis sidemember.

The valve comprises a body and cover containing a spring, a diaphragm assembly and a spring-loaded inlet/exhaust valve. The diaphragm assembly consists of a diaphragm (1) and a hollow plunger (2) which contacts the inlet/exhaust valve (4). A nut, fitted with an exhaust diaphragm retains the inlet/exhaust valve and spring in position in the body.

Compressed air from the reservoir enters the supply port (7) beneath the diaphragm. When the air pressure is sufficient to overcome the spring pressure the diaphragm assembly lifts and the spring-loaded inlet/exhaust valve contacts the exhaust valve seat (6) in the body. Further movement of the diaphragm assembly causes the inlet valve seat (5) to move away from the inlet/exhaust valve and air passes through the hollow plunger and delivery port (3) to operate the compressor unloader valve.

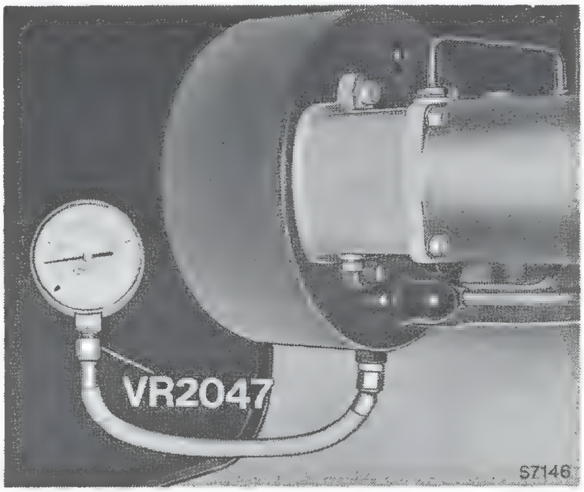


60 COMPRESSOR GOVERNOR VALVE (Contd)

As the air pressure in the reservoir decreases, the spring depresses the diaphragm assembly. When this occurs the plunger closes the inlet valve and opens the exhaust valve allowing the air pressure in the compressor unloader valve to exhaust through the exhaust nut to atmosphere and normal operation of the compressor is resumed.

60a COMPRESSOR GOVERNOR VALVE – Operating Test

Operation of governor valve may be checked by installing Gauge VR2047 in reservoir drain plug boss and charging system until valve cuts out and further compression of air ceases.



If pressure is not within specified limits slacken adjusting screw locknut and turn screw clockwise to increase pressure or anti-clockwise to reduce.

60b COMPRESSOR GOVERNOR VALVE – Leakage Test

Inlet valve and plunger sealing ring may be checked for leaks by charging system to just below governor valve cut-out pressure and smearing soap solution over valve body and cover. Leakage from exhaust diaphragm must be less than a one inch soap bubble in five seconds.

Leakage from vent hole in cover indicates a faulty main diaphragm.

Fully charge system and again check for leakage at exhaust diaphragm. Leakage in excess of a one inch soap bubble in five seconds indicates a faulty exhaust valve or seat.

60c COMPRESSOR GOVERNOR VALVE – Disassembly and Inspection

Remove cover screws progressively after backing off adjusting screw.

Secure diaphragm plunger by inserting a rod through cross hole while removing diaphragm retaining nut.

Inlet/exhaust valve, spring retainer and spring may be removed after unscrewing exhaust nut.

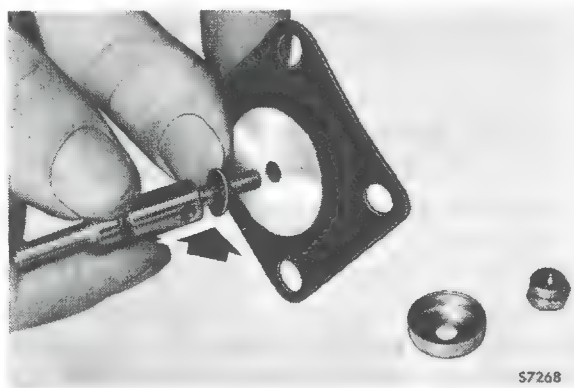
S7269

Exhaust diaphragm is secured by screw and plate.

Ensure that air passages in body and vent in cover are not obstructed.

60d COMPRESSOR GOVERNOR VALVE – Reassembly and Installation

When assembling diaphragm and plunger, locate fabric washer between diaphragm plate and shoulder of plunger.



S7268

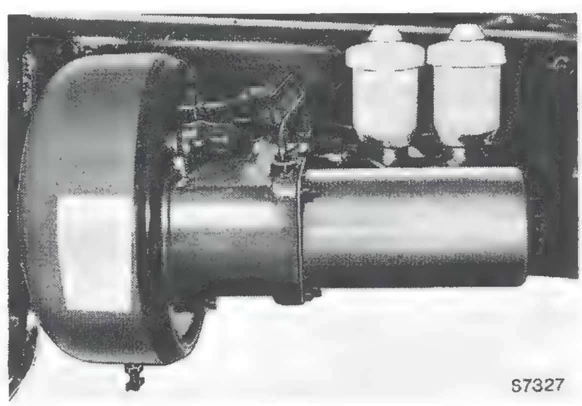
Ensure bevel edged diaphragm plate is located below diaphragm, with bevelled edge towards diaphragm.

Smear plunger with recommended grease before installation.

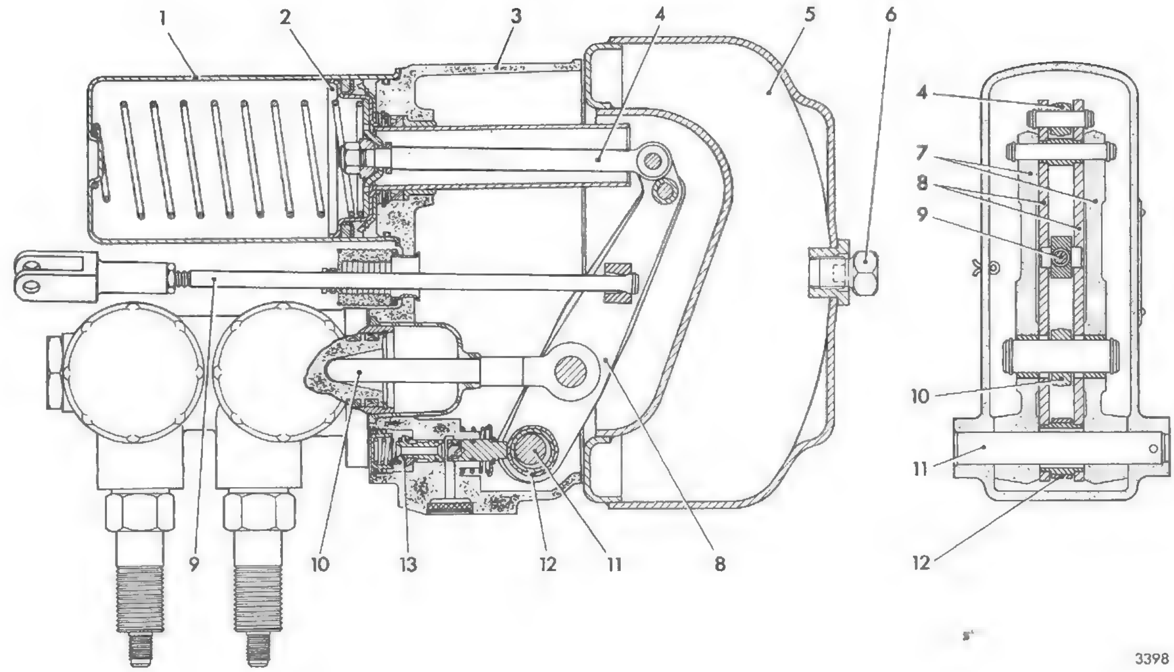
After installing governor valve carry out operating and leakage tests.

61 AIR PRESSURE SERVO

The air pressure servo is supported by the hydraulic master cylinder mounted on the outside of the chassis sidemember, and linked to the brake pedal via a relay lever.

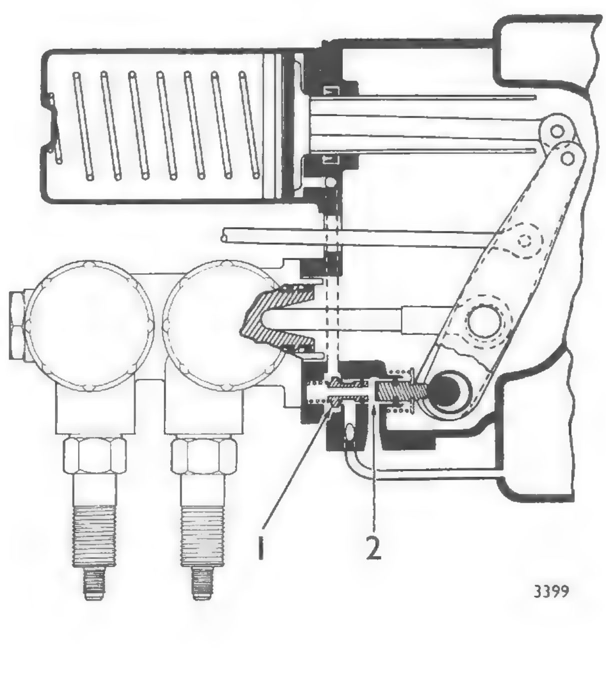


S7327

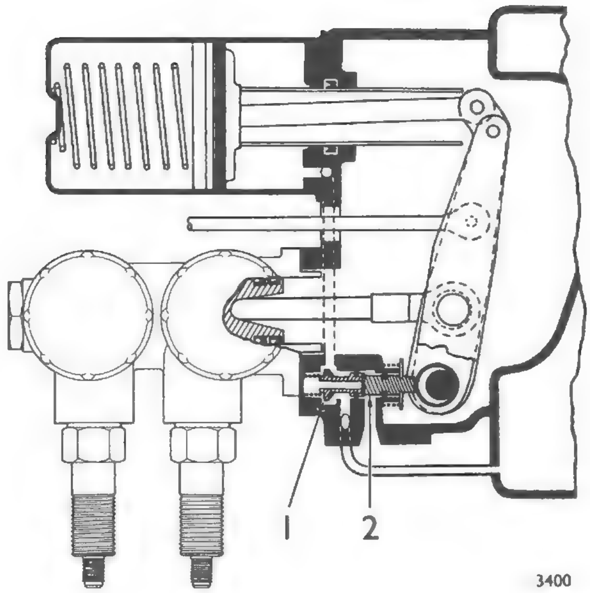


The servo consists of an air cylinder (1) and piston (2), a lever housing (3) and an air pressure reservoir (5). The lever assembly consists of two inner reaction levers (8) assembled to two outer brake levers (7) which pivot on a shaft (11) in the housing. A roller (12), which operates the inlet/exhaust valve (13), is located between the reaction levers on the support shaft. The reaction levers are connected to the servo pull rod (9) and piston rod (4) and the brake levers are connected to the master cylinder push rod (10). The air reservoir is bolted to the rear of the lever housing and has provision for an air supply from the compressor, governor feed pipe and low pressure warning switch. The reservoir is provided with a drain tap and safety valve (6).

In the 'brakes off' position the levers are held in the extreme rearward position by the servo pull rod and brake linkage. In this position the air inlet valve (1) is closed and the exhaust valve (2) open.



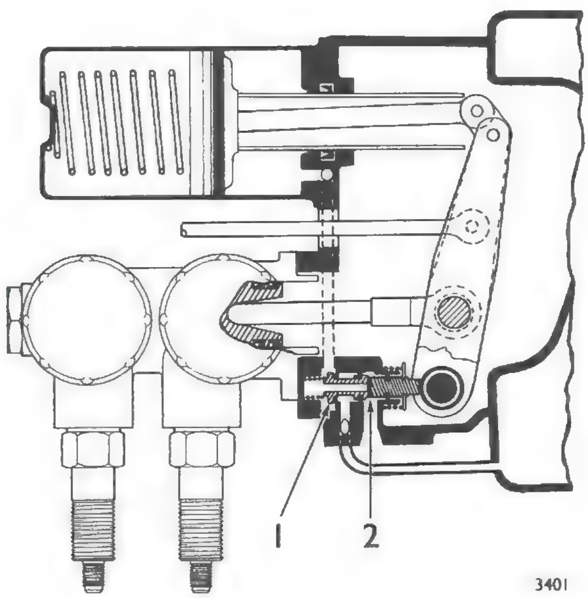
On application of the brake pedal, movement is transmitted through the servo pull rod to the reaction levers which pivot momentarily on the pin adjacent to the piston rod. The levers then move through the clearance between the support shaft and the levers, and the roller moves the valve plunger to close the exhaust valve (2) against the end of the inlet valve (1).



3400

Further movement opens the inlet valve admitting compressed air from the reservoir to the air cylinder through an external pipe. The piston then moves along the cylinder to augment the effort at the brake pedal.

If the brake pedal is held in the 'brakes on' position the pressure differential across the piston counteracts the effort on the servo pull rod. This restores the reaction levers centrally across the support shaft and closes the inlet valve (1) without opening the exhaust valve (2).



3401

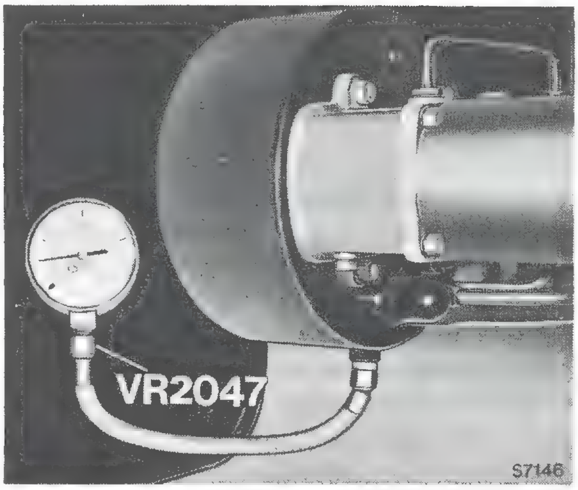
This limits the pressure on the piston to a degree proportional to the effort on the brake pedal.

When all pressure is removed from the brake pedal the reaction levers move rearwards allowing the inlet valve to close and the exhaust valve to open. Air from the cylinder then escapes through the centre of the inlet valve to the breather in the lever housing.

61a AIR PRESSURE SERVO – Leakage Test

Servo may be checked for leakage by installing a Gauge VR2047 in reservoir drain tap boss, fully charging air system and smearing breather in lever housing with soap solution.

Leakage indicates a faulty inlet valve.



S7146

With system fully charged, maintain heavy pressure on brake pedal and observe rate of leakage on gauge. Leakage in excess of 0.1 bar (1lb/sq in.) in 60 seconds indicates defective seals on servo piston or sleeve, air cylinder, or inlet valve retaining plug.

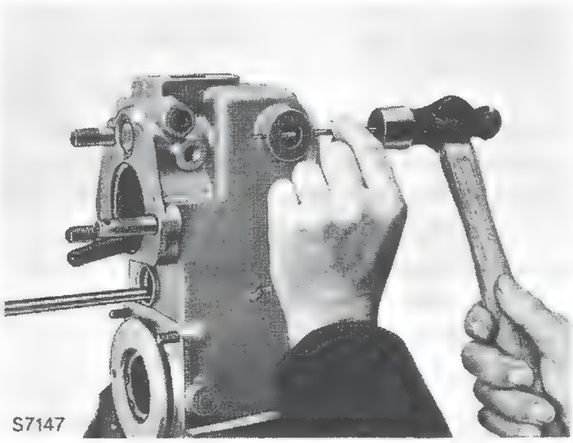
61b AIR PRESSURE SERVO – Disassembly

When removing master cylinder from servo note number of shims between attaching faces. Shims control clearance between push rod and master cylinder primary piston.

Reservoir may be detached after disconnecting air pipe and removing securing nuts.

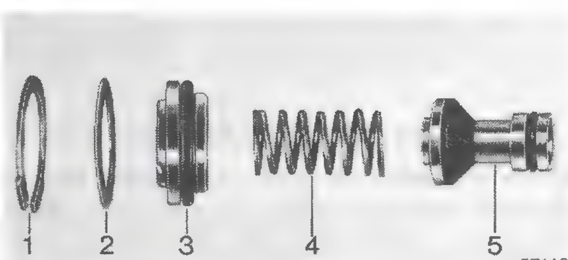
Piston, spring and cylinder may be withdrawn as an assembly after removing cylinder retaining nuts and pin securing piston rod to levers.

Lever support shaft is secured by a pin in housing flange.



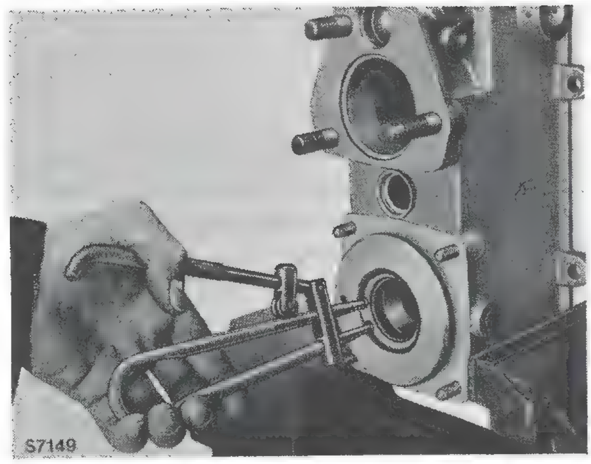
S7147

Air inlet valve (5), spring (4), plug (3) and washer (2) are retained by circlip (1).



S7148

Piston sleeve seal and washer are retained by a circlip.



61c AIR PRESSURE SERVO – Inspection

Discard components which will be replaced from repair kit and thoroughly clean all other parts.

All components should be examined for excessive wear or damage.

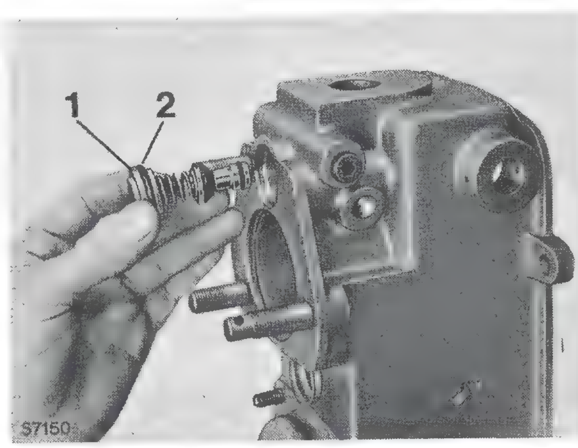
Slight corrosion in cylinder may be removed with fine abrasive cloth but a scored cylinder must be renewed.

61d AIR PRESSURE SERVO – Reassembly

Before reassembly smear working surfaces of levers, piston, cylinder and valves and seals with recommended grease.

Lip of piston seal faces towards piston sleeve, and lip of sleeve seal towards piston.

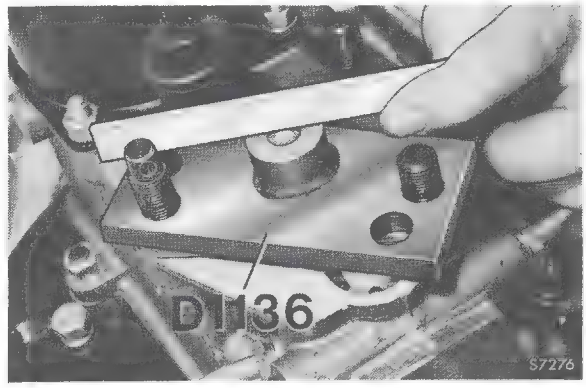
When installing inlet valve assembly, insert plug (1) in bore only as far as necessary to locate retaining circlip. If plug is pushed too far into bore, sealing ring (2) may be displaced when plug returns against circlip, causing air leakage.



Before installing master cylinder, determine thickness of shims required between cylinder and servo to provide correct clearance between push rod and master cylinder primary piston.

61d AIR PRESSURE SERVO – Reassembly (contd)

To determine thickness of shims, use Gauge D1136 and add shims until push rod is flush with gauge when shims are compressed by securing gauge with two nuts.



62 COMPRESSOR CYLINDER HEAD

The compressor cylinder head consists of a finned casting incorporating intake and delivery valve discs spring-loaded against removable seats. An unloader valve consisting of a spring-loaded plunger is situated above the intake valve.

62a COMPRESSOR CYLINDER HEAD – Air Leakage Test

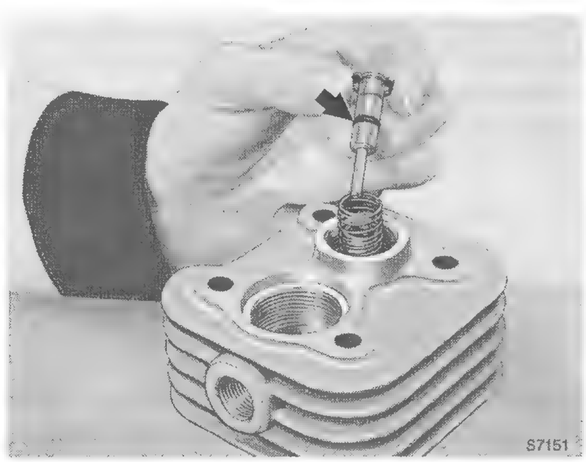
Delivery valve may be checked for leakage by charging system to just below governor valve cut-out pressure. Leakage will be audible with engine stopped.

With system fully charged and engine stopped, audible air leakage indicates a faulty unloader valve plunger sealing ring.

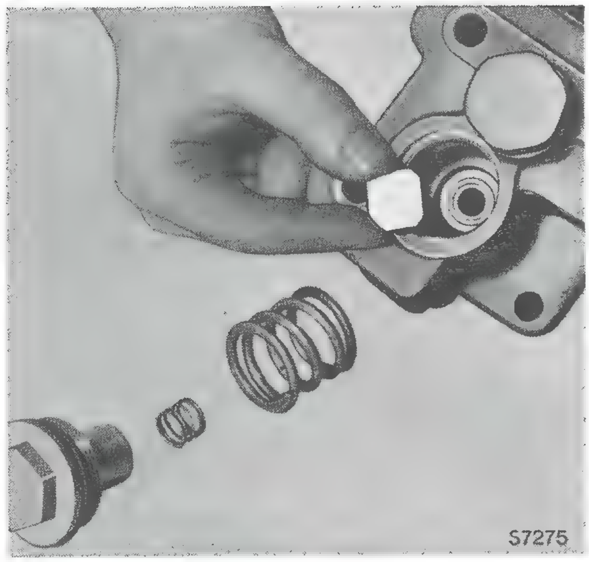
62b COMPRESSOR CYLINDER HEAD – Removal and Disassembly

Compressor cylinder head may be withdrawn after removal of air lines and securing nuts.

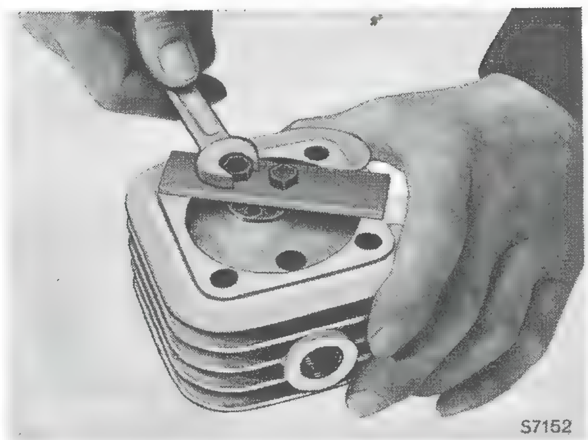
Unloader valve plunger, sealing ring (arrowed) and spring are retained by a threaded cap.



Delivery valve, spring, and seat retaining spring may be withdrawn after removing valve cap. Valve seat may be removed, if necessary, by tapping head on a wooden block after uniformly heating head.

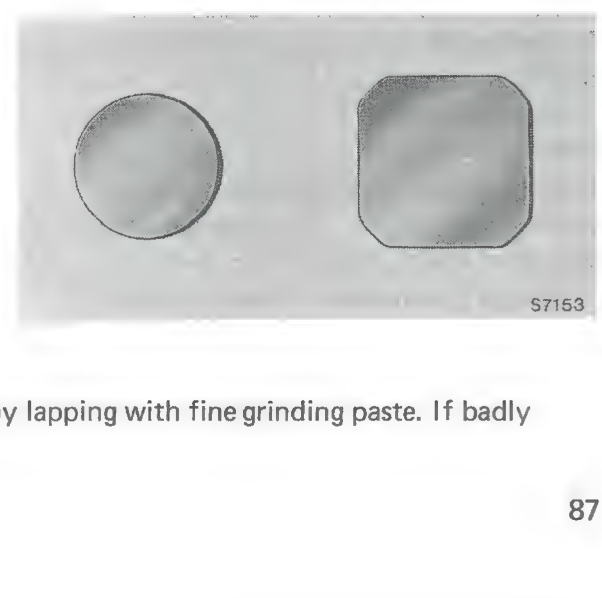

S7275

Intake valve, spring and seat may be withdrawn after removing spring guide. Guide may be removed using a metal plate and two bolts.


S7152

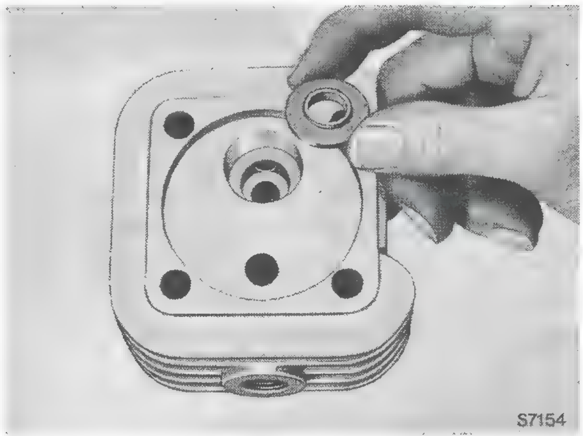
62c COMPRESSOR CYLINDER HEAD — Inspection and Reconditioning

Intake valve (left) and delivery valve (right) can be refaced by lapping on very fine emery paper held on a flat surface but they should be renewed if badly grooved.

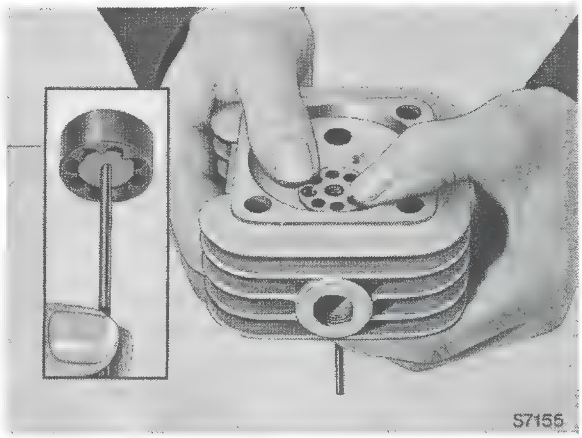

S7153

Slight scratches on valve seats may be removed by lapping with fine grinding paste. If badly pitted use a seating cutter before lapping.

Install intake valve seat with raised seating facing away from unloader valve guide.



When installing intake valve guide, ensure washer is located between spring and guide recess and hold valve depressed by inserting a rod through unloader valve guide. Retain guide by staking.



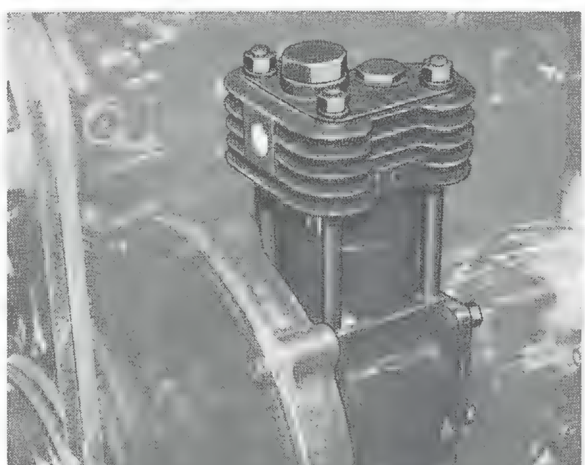
Assemble delivery valve seat so that external chamfer contacts seal in valve chamber.

Install cylinder head with intake port towards drive end of compressor and tighten retaining nuts to specified torque.

63 COMPRESSOR

A Clayton Dewandre Type SC6 single-cylinder, air-cooled compressor mounted on the engine timing case supplies compressed air for the brake system.

The compressor is driven by the crankshaft through an idler gear and is lubricated via a pipe from the engine oil filter. Surplus oil returns to the engine crankcase through holes in the drive end of the compressor crankcase.



Output of the compressor is controlled by a governor valve. When the air pressure in the reservoir reaches the governor valve setting, air passes to the cavity above an unloader valve in the compressor cylinder head. The air pressure depresses the unloader valve plunger which holds open the compressor intake valve and prevents further compression of air. When the air pressure in the reservoir falls, the governor valve exhausts the air from the unloader valve and normal functioning of the compressor is resumed.

The compressor intake may incorporate a feed from an anti-freezer unit.

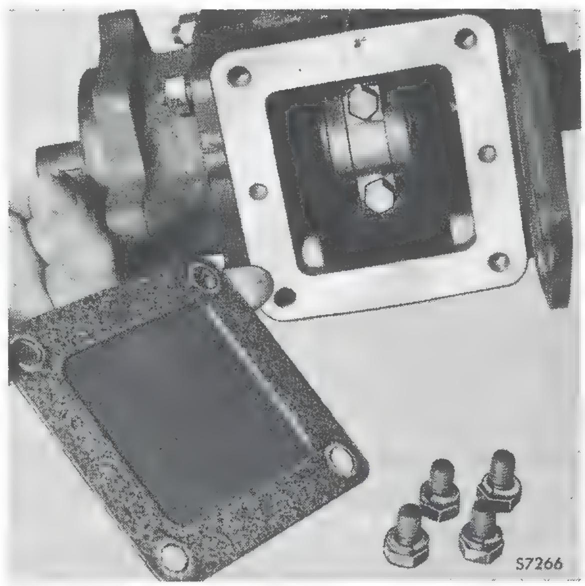
Removal and installation of the compressor is described in Training Manual TS 1084.

63a COMPRESSOR – Disassembly

Disassemble compressor cylinder head as previously described.

Mark cylinder in relation to crankcase before removal.

Access to connecting rod cap bolts is gained by removing bottom cover. Mark connecting rod in relation to cap before removal.



S7266

Piston pin is retained by circlips.

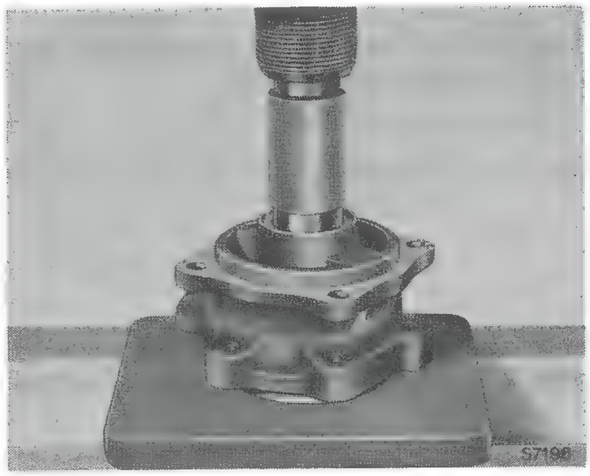
Crankshaft and bearing are removed with drive end cover.

S7157

63b COMPRESSOR – Reconditioning

When installing rear end cover seal, ensure lip of seal faces towards inside of cover.

A new rear end cover bush must be pressed into cover until flush with bottom of cover bore chamfer. After installation, bush must be fine bored to specified diameter.



Hone a replacement connecting rod bush to provide specified clearance for piston pin.

Wear on cylinder bore should not exceed 0.002 in. ovality or 0.005 in. taper.

63c COMPRESSOR – Reassembly

Before reassembly lubricate bearings and all working surfaces with engine oil.

When installing drive end cover gasket ensure oil drain holes align with holes in cover.

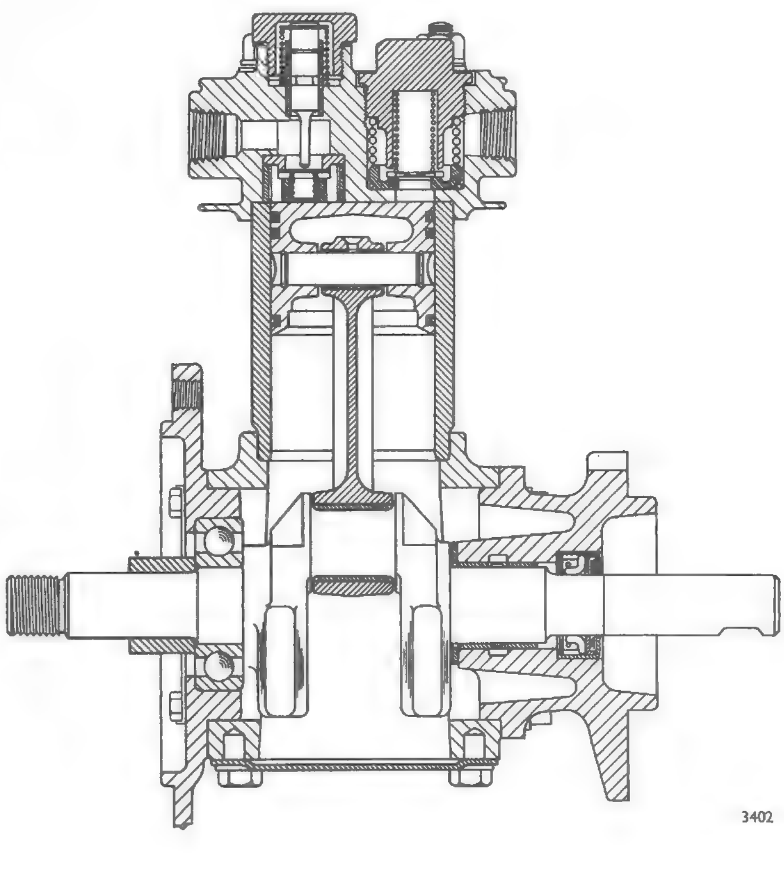
Install rear end cover with oil pipe connection uppermost.

Ensure crankshaft rotates freely after tightening all cover bolts to specified torque.

Secure drive end cover bolts with tabwashers.

Piston compression rings must be installed with step towards piston crown.

Tighten connecting rod bolts to specified torque.



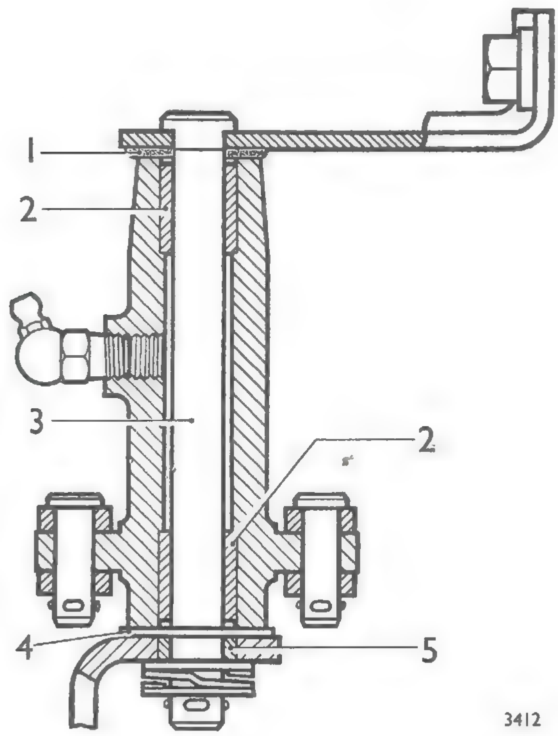
3402

64 PARKING BRAKE LEVER AND LINKAGE

The parking brake lever is bolted to a bracket attached to the chassis crossmember, and positioned between the driver and passenger seats.

A cable connects the lever to a vertically mounted bell crank lever attached to the rear axle housing. Rods connect the bell crank lever to the rear brake cylinders.

The bell crank lever pivots on a pin (3) supported by two brackets attached to the axle housing. A rubber seal (1) is interposed between the lever and the upper support bracket and a thrust washer (4) between the lever and the lower bracket. The lever bushes (2) are of the sintered bronze type and a bearing (5) is located in the lower bracket.



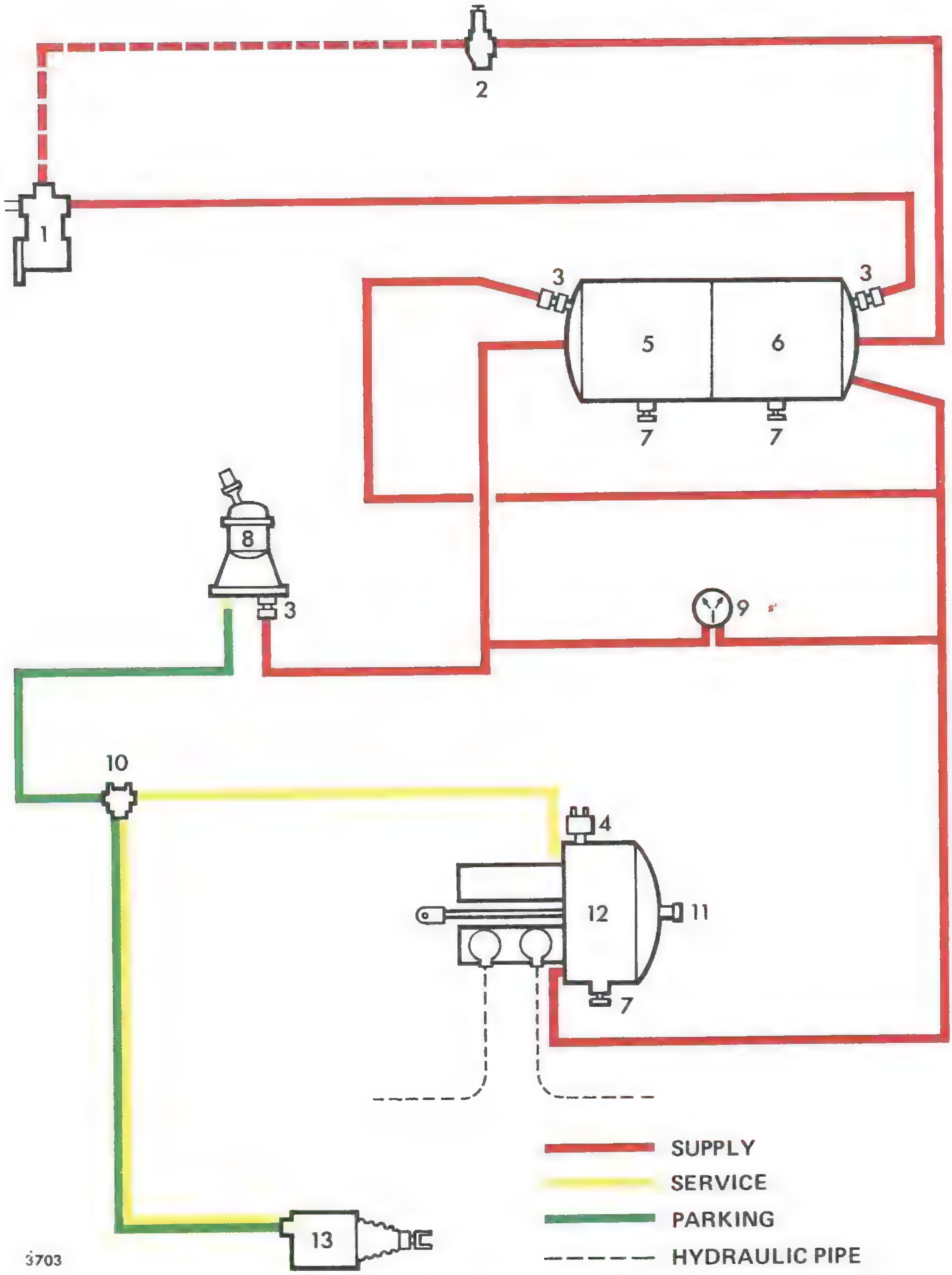
64a PARKING BRAKE LINKAGE – Adjustment

Refer to Section 46a.

64b PARKING BRAKE LEVER AND CABLE

Refer to Section 17b.

AIR PRESSURE SERVO-ASSISTED HYDRAULIC SYSTEM WITH SPRING BRAKE ACTUATOR



1. Compressor
2. Governor valve
3. Non-return valve
4. Low pressure warning switch
5. Secondary reservoir
6. Primary reservoir
7. Drain tap
8. Parking brake control valve
9. Dual air pressure guage
10. Change-over valve
11. Safety valve
12. Servo
13. Spring brake actuator

Schematic diagram of braking system

The service brake, operated by the footbrake pedal, applies the front and rear brakes through a hydraulic system assisted by a Clayton Dewandre air pressure servo.

The parking brake control valve operates the brakes on the rear wheels by means of a spring brake actuator and mechanical linkage. When the parking brake is applied, air is exhausted from the spring brake actuator and the rear brakes are held on by spring pressure. The parking brake system also provides the secondary braking system.

Two alternative makes of parking brake control valve and spring brake actuator are used, Clayton Dewandre or Westinghouse.

The service reservoir has provision for attachment of an independent air supply should it become necessary to move the vehicle while the engine is inoperative.

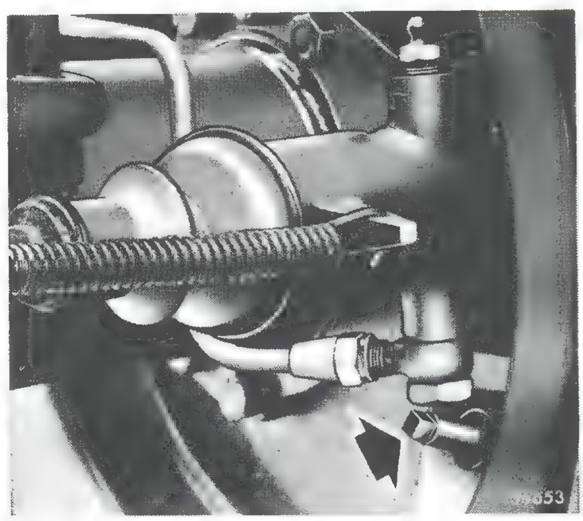
The hydraulic brakes are of the leading/trailing shoe type operated by double-acting brake cylinders from a master cylinder mounted with the servo on the chassis frame sidemember.

The servo utilises air pressure developed by a single-cylinder engine-driven compressor. A compressor governor valve and a safety valve are incorporated in the system.

To prevent air operated auxiliaries affecting the performance of the brake system on coaches, a pressure loss limiting valve must be installed in the auxiliary equipment supply air line. Information on the pressure loss limiting valve is given in Section 142.

65 BRAKE ADJUSTMENT

Footbrake adjustment is as described in Section 31 except that a slotted-drum type adjuster actuated by a sprocket attached to a square-headed spindle is used on the rear brakes of Models EOL, EOM and POK. Clockwise rotation of the spindle expands the brake shoes.



Before adjusting brakes, fully charge air system and release parking brake. The parking brake is adjusted automatically with the footbrake and no other adjustment is required except after parts of the parking brake linkage have been disturbed.

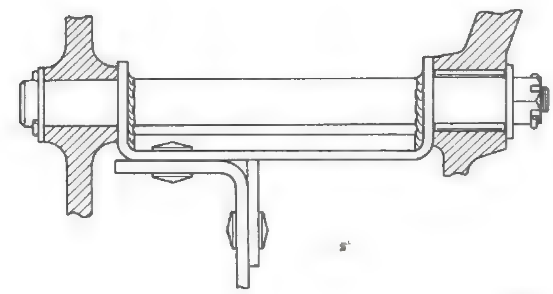
66 BLEEDING THE HYDRAULIC SYSTEM

Bleeding the hydraulic system is as described in Section 2 except that the air system should be fully charged, with the parking brake released and air exhausted from the service and servo reservoirs by means of the servo drain tap. Brake adjustment need not be disturbed.

67 BRAKE PEDAL AND LINKAGE

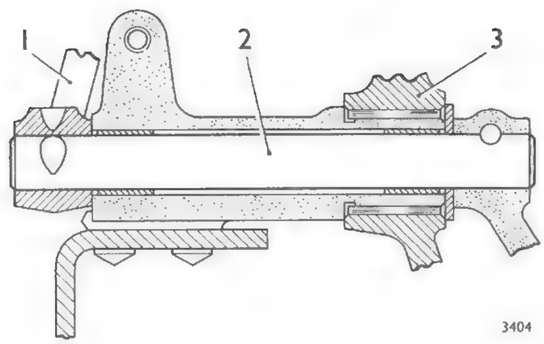
The brake pedal and linkage on Models EOL, EOM and EON is similar to that described in Section 20 except that the relay lever is connected to the servo pull rod.

On Model POK the brake pedal is mounted on bearing rollers and, on right drive vehicles, is supported together with the clutch pedal on a shaft attached to the chassis frame.



3581

On left drive vehicles the brake pedal (3) pivots on the outside of a bracket which supports the clutch pedal (1) and shaft (2).



3404

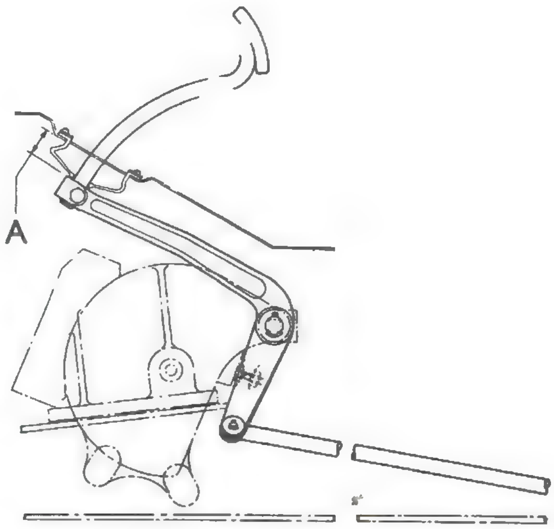
A plate carrying an adjustable pedal stop bolt is attached to the chassis frame in front of the pedals.

The relay lever is supported by a bracket attached to the chassis frame and pivots on bearing rollers.

67a BRAKE PEDAL SETTING

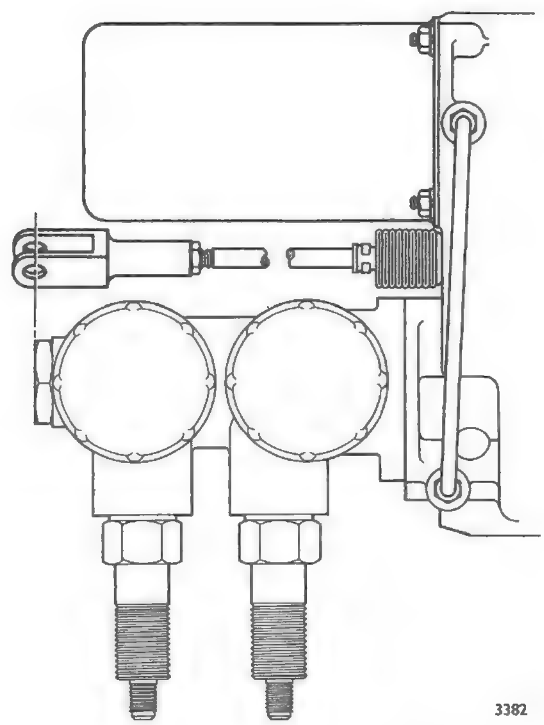
It is not usually necessary to alter the brake pedal setting unless the stop bolt has been disturbed or parts of the linkage renewed.

Setting is adjusted by disconnecting push rod from relay lever and adjusting pedal stop bolt until distance between pedal lever and underside of toe panel (dimension 'A'), is 1.00 in.



2297

Check adjustment of servo pull rod by disconnecting return spring and lightly pulling rod out of servo until resistance is felt. Centre of pull rod hole should be flush with front face of master cylinder plug on Models EOL, EOM and EON, and 0.80 in. forward of plug on Model POK.



3382

With push rod held forward so that pedal is in contact with stop, pull rod lightly out of servo until resistance is felt. Adjust push rod clevis until pin hole in rod aligns with pin hole in relay lever.

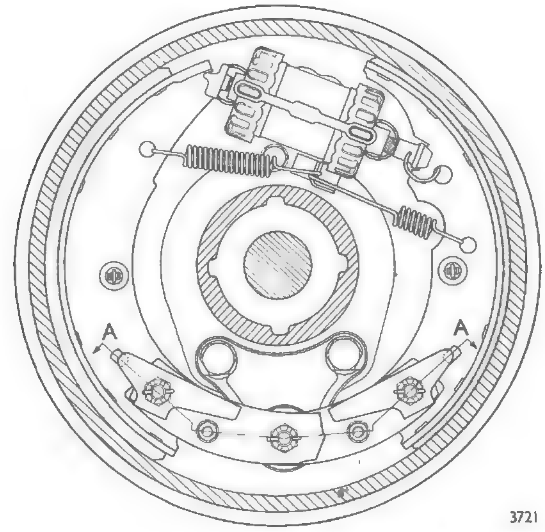
After installing clevis pin back off pedal stop bolt one-third of a turn to provide pedal free travel.

68 BRAKE DRUMS

Refer to Section 34.

69 FRONT BRAKE SHOES

The front brakes are similar to those described in Section 5 except that each shoe is provided with a drum-type adjuster and individual pull-off spring.



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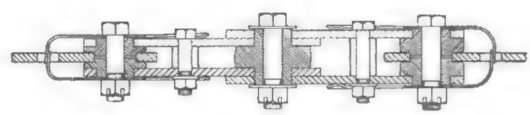


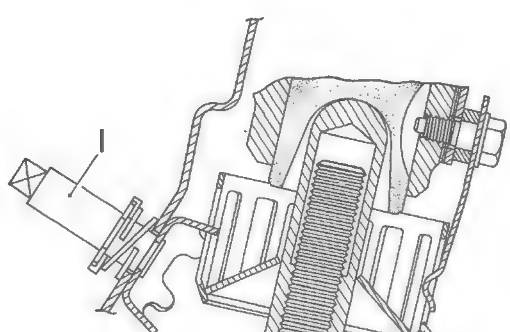
SECTION A-A 3712

When refacing shoes on Model EON, install shorter rivets in eight holes nearest centre of shoe.

When assembling pull-off springs attach squared end to brake shoe and ensure spring with greater number of coils is attached to leading shoe.

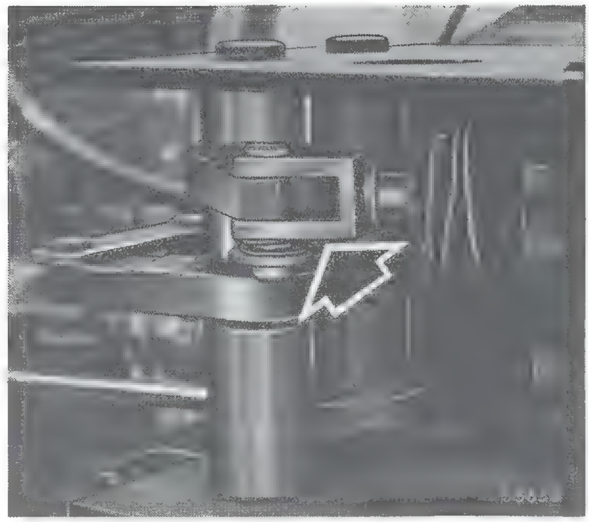
70 REAR BRAKE SHOES

The rear brakes are similar to those described in Section 6 except that drum-type shoe adjusters (2), actuated by a sprocket attached to a square headed spindle (1) are used on Models EOL, EOM and POK.



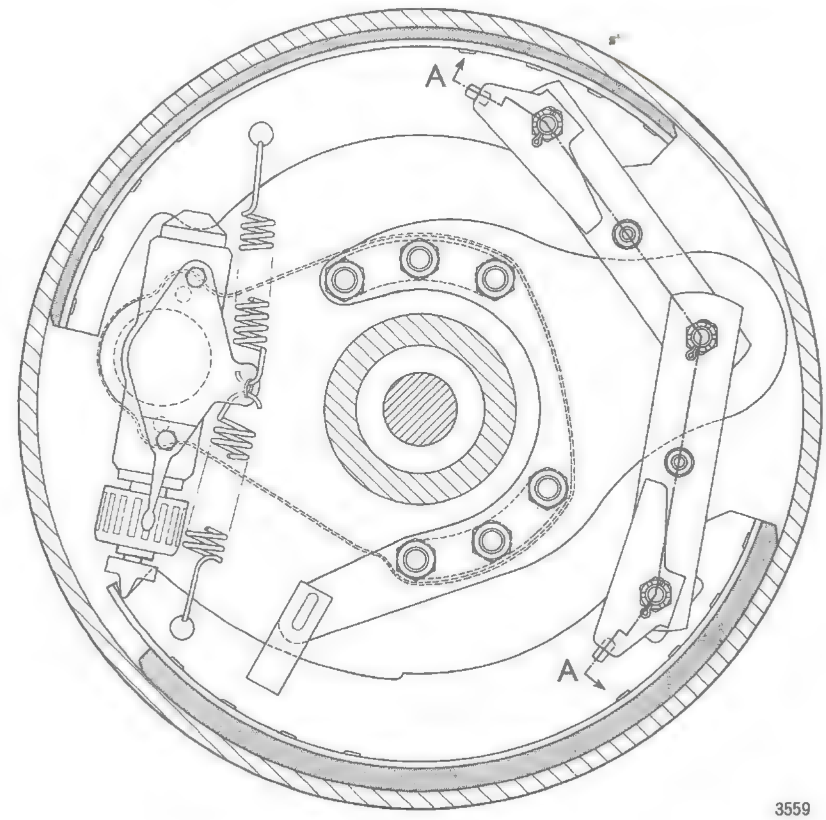
3396

Before removing hub and drum assembly, fully charge air system, release parking brake, and disconnect spring brake actuator clevis from relay lever.



When refacing shoes on Model EON, install shorter rivets in eight holes nearest centre of shoe.

When assembling pull-off springs, attach squared end to brake shoe and ensure spring with larger coils is attached to leading shoe.



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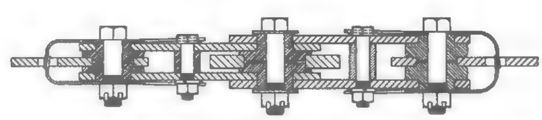


SECTION A-A

3714

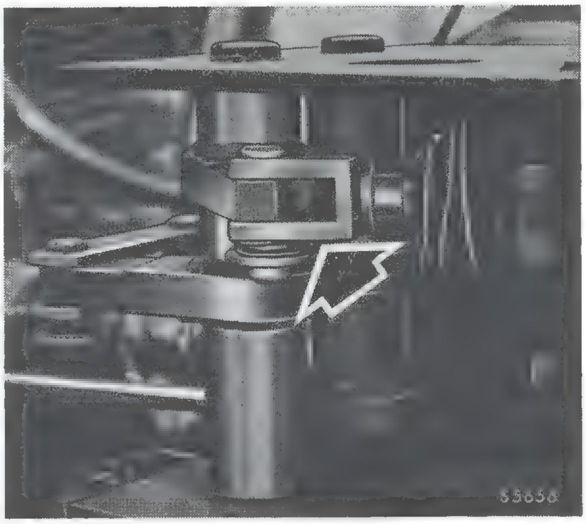
71 FRONT BRAKE CYLINDERS

The front brake cylinders are similar to those used with suspended vacuum servo assisted brakes and the information contained in Section 37 may be applied.

72 REAR BRAKE CYLINDERS

The rear brake cylinders are similar to those used with direct-vacuum servo-assisted brakes and the information contained in Section 8 may be applied.

Before removing pull rod from bell crank lever, fully charge air system and, with parking brake released, disconnect spring brake actuator clevis from relay lever.



After installing cylinder, adjust length of rods as described in Section 86a.

73 REAR BRAKE BISECTORS

The rear brake bisectors are similar to those used with direct vacuum servo assisted brakes and the information contained in Section 9 may be applied except for the brake cylinder removal and installation procedure described in Section 72.

74 MASTER CYLINDER

Refer to Section 56.

75 NON-RETURN VALVES

A non-return valve is fitted to the service and secondary reservoirs, and the servo reservoir on Model POK at the reservoir supply connections. A non-return valve is also incorporated in the air line between the secondary reservoir and the parking brake control valve.

Each valve consists of a body and screw cap containing a half-round rubber valve, spring loaded against a valve seat.

75a NON-RETURN VALVES — Leakage Test

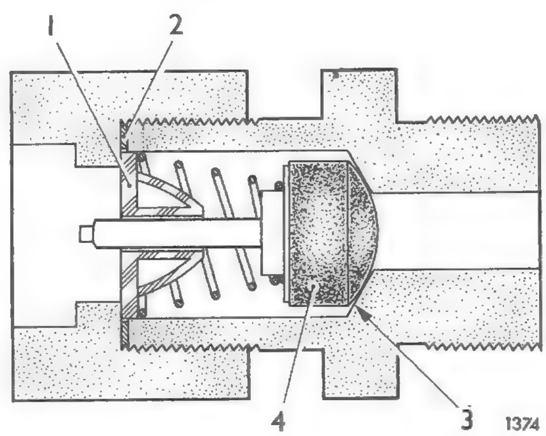
Reservoir non-return valves may be checked for leakage by fully charging air system and, with engine stopped, disconnecting pipe from valve. With open end of valve smeared with soap solution, leakage should not exceed a one inch bubble in one second.

Line non-return valve attached to parking brake control valve may be checked for leakage by releasing parking brake and disconnecting supply pipe from valve. Before disconnecting pipe, exhaust air from secondary reservoir by means of drain tap.

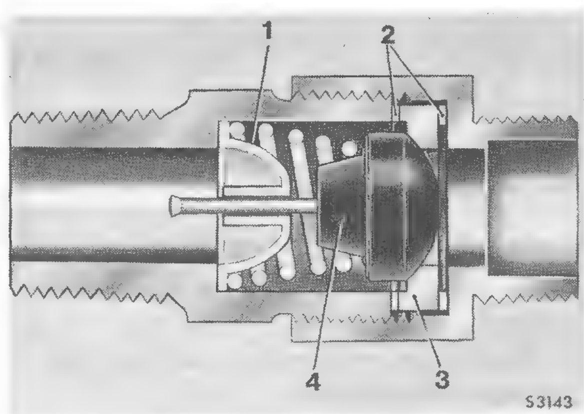
With open end of valve smeared with soap solution, leakage should not exceed a one inch bubble in one second.

75b NON-RETURN VALVES — Reassembly and Installation

When reassembling a reservoir non-return valve, install sealing washer (2) in reservoir boss and place valve assembly (1) in cap so that rubber valve (4) is in contact with its seat (3).



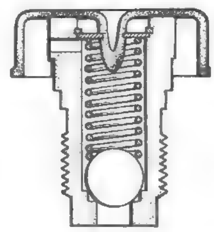
When reassembling line non-return valve, install a sealing washer (2) on each side of valve seat (3). Install valve assembly (1) so that rubber valve (4) is in contact with its seat.



When installing line non-return valve, ensure arrow on body is in direction of parking brake control valve. When installing servo non-return valve on Model POK, ensure arrow on body is in direction of servo reservoir.

76 SAFETY VALVE

A safety valve, located in the servo reservoir, protects the air system against excessive pressure in the event of governor valve failure. The valve is non-adjustable and consists of a body containing a spring-loaded ball valve retained by a washer and circlip. A dust cover is fitted over the valve body.



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76a SAFETY VALVE — Operating Test

Operation of safety valve may be checked by disconnecting air line to governor valve at service reservoir and installing a plug in reservoir connection. Charge system and note pressure, registered on vehicle gauge, at which safety valve operates.

If valve fails to release air at specified pressure remove and clean valve. If valve still fails to operate, renew valve.

76b SAFETY VALVE — Leakage Test

Safety valve may be checked for leakage by fully charging system and smearing valve with soap solution. If leakage exceeds a one inch soap bubble in five seconds renew valve.

77 STOP LAMP SWITCHES

A stop lamp switch of the spring-loaded plunger-type is supported by a bracket attached to the cab underbody. The switch is operated by a striker secured to the brake pedal push rod.

A second stop lamp switch, of similar construction, is attached to the spring brake actuator support and operated by the relay lever.

Adjustment of switch position is by means of two nuts threaded on switch body. With brake pedal or parking brake in off position, adjust position of switch so that contacts just part. At no time should switches be located so that plunger is fully depressed otherwise brakes may be prevented from releasing.

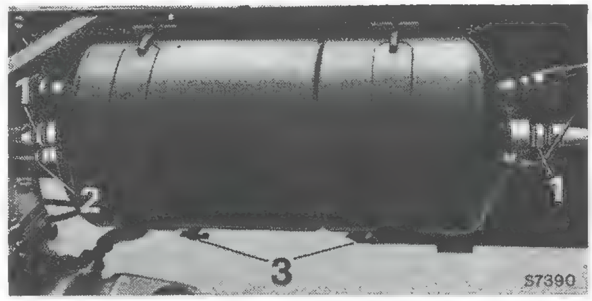
The switches, which are sealed units, must be renewed if defective.

78 LOW AIR PRESSURE WARNING SWITCH

Information concerning the low air pressure warning switch, on Model POK, is contained in Section 102.

79 DUAL AIR RESERVOIR

A dual reservoir comprising a service air reservoir and a secondary air reservoir combined in one assembly is mounted on the inside of the chassis sidemember.



The reservoirs are fed from the compressor via non-return valves (1) and are provided with drain taps (3). An air line from the service reservoir supplies the servo reservoir and the secondary reservoir supplies air to the parking brake control valve.

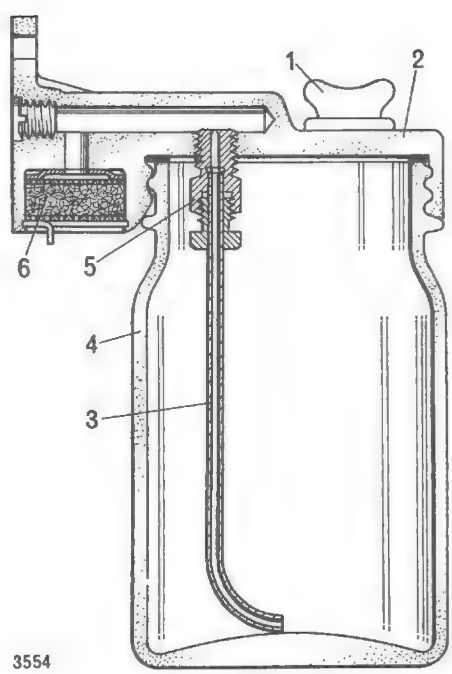
Both reservoirs incorporate air line connections to a dual air pressure gauge inside the vehicle, and the service reservoir also incorporates a feed (2) to the compressor governor valve.

80 COMPRESSOR GOVERNOR VALVE

The compressor governor valve is similar to that described in Section 60. The cut-out pressure may be checked on the vehicle dual air pressure gauge.

81 COMPRESSOR ANTI-FREEZER

To prevent freezing of the moisture in the air drawn into the compressor when the vehicle is operating under low ambient temperature conditions an anti-freezer may be incorporated in the air system. The anti-freezer consists of a reservoir (4) and cover (2) fitted with an air filter (6), filler plug (1) and metering jet (5). Under conditions of low ambient temperature the reservoir is filled with methyl alcohol solution. When the compressor is operating a partial vacuum is present in the compressor intake and above the methyl alcohol in the anti-freezer reservoir. This causes air to pass through the air filter and tube (3) to the bottom of the reservoir, where it mixes with the alcohol and the vapour is bled into the compressor inlet.



81a COMPRESSOR ANTI-FREEZER – Disassembly and Inspection

Metering jet and tube may be removed after unscrewing reservoir. Air filter is retained by spring ring. Ensure air passages in cover and vent tube are not obstructed. Inspect cover sealing ring for deterioration.

81b COMPRESSOR ANTI-FREEZER – Reassembly

When assembling air filter, install stepped washer with convex side towards cover and position a perforated disc on each side of filter.

82 AIR PRESSURE SERVO

The air pressure servo is similar to that described in Section 61 except that the governor feed pipe is connected to the service side of the dual air reservoir, and the low pressure warning switch is incorporated in the dual air pressure gauge.

83 COMPRESSOR CYLINDER HEAD

Refer to Section 62.

84 COMPRESSOR

Information concerning the compressor is contained in Section 63.

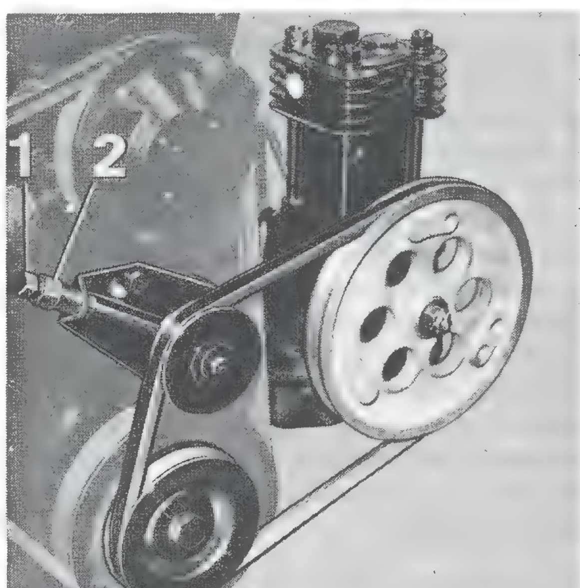
On Model EDL the compressor is mounted on the engine crankcase and belt driven from the crankshaft pulley.

84a COMPRESSOR – Drive Belt Adjustment

Drive belt adjustment is attained by repositioning jockey pulley.

Jockey pulley locking sleeve (2) must be slackened before turning square head (1) on adjusting bolt.

Belt tension should be as specified.



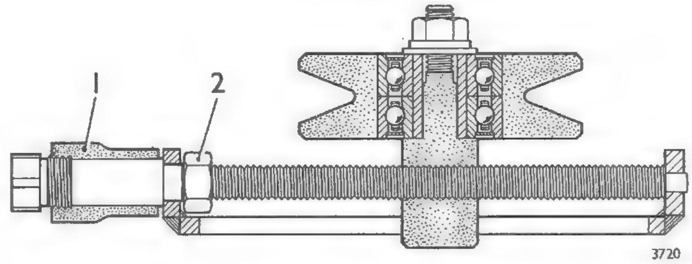
The pulley assembly, comprising a mounting bracket, adjusting bolt, pulley support stud and pulley, is mounted in front of the engine timing cover.

Pulley can be withdrawn from support stud after removing centre nut and washers.

Bearings and centre sleeve should be installed flush with pulley face.

Bearings with a single shield should be packed with recommended grease and installed with shielded side outwards.

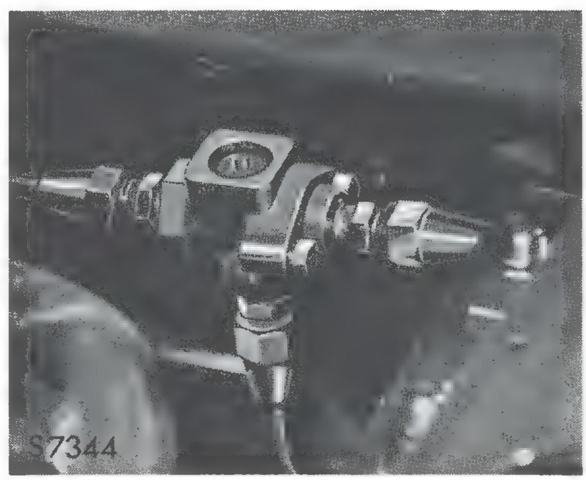
Adjusting bolt can be removed after slackening locking sleeve (1) and locking nut (2). On reassembly, locking nut must be tightly secured against shoulder on adjusting bolt.



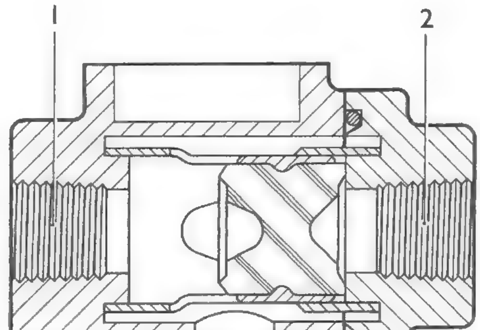
85 CHANGE-OVER VALVE

The change-over valve, which is located on the chassis frame prevents compound application of the rear brakes by means of the spring brake actuator and the hydraulic system. The change-over valve also prevents leakage through the parking brake control valve if the footbrake is applied with the control valve in the 'PARK' position.

The valve consists of a body which has two supply ports and one delivery port. The body contains a shuttle valve which is free to move along a guide.



When the parking brake control valve is moved to the 'OFF' position compressed air enters supply port (1) and moves the shuttle valve to the opposite end to seal the other supply port. This allows air to pass through the delivery port (3) to the spring brake actuator and prevents leakage through supply port (2) to the servo.



85a CHANGE-OVER VALVE – Leakage Test

Leakage at parking brake control valve port of the change-over valve may be detected by fully charging system and smearing exhaust port of parking brake control valve with soap solution. Leakage in excess of a ½ in. bubble in five seconds, with parking brake control valve in 'PARK' position and footbrake applied, indicates a faulty shuttle valve.

Leakage at servo port of change-over valve may be detected by fully charging system and smearing breather in servo lever housing with soap solution. Leakage in excess of a ½ in. bubble in five seconds, with parking brake valve in 'OFF' position, indicates a faulty shuttle valve.

Change-over valve may be disassembled by removing cover.

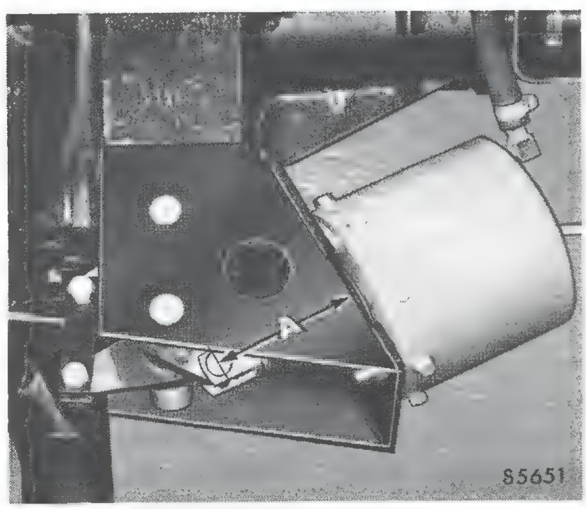
Before reassembly, smear shuttle valve sleeve and inner surface of guide with recommended grease.

86 PARKING BRAKE LINKAGE

The parking brake linkage comprises a relay lever and bell crank lever which are linked together and pivot in the spring brake actuator support attached to the axle housing. The relay lever is connected to the spring brake actuator, and the bell crank lever to the brake cylinders by pull rods.

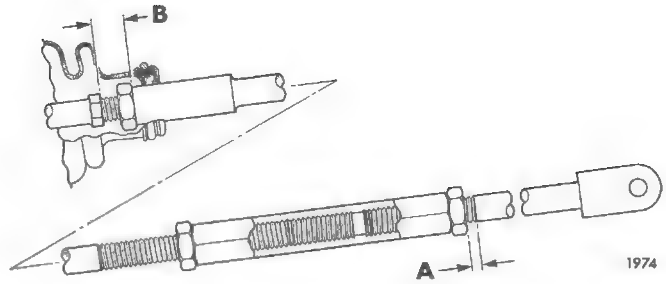
86a PARKING BRAKE LINKAGE – Adjustment

With air system fully charged and parking brake released pull clevis rod out of spring brake actuator to full extent of its travel and check that dimension 'A', between actuator body and centre of clevis, is 5.88 in. If adjustment is necessary, detach gaiter from actuator clevis and slacken pull rod locknut. Turn pull rod clockwise as viewed from clevis to increase dimension or anti-clockwise to decrease.



It is essential that system is fully charged and parking brake control valve lever is in 'OFF' or RELEASE' position during this operation.

With rear brake shoes adjusted hard against drums check that length of exposed thread beyond turnbuckle locknut on bell crank lever rod is 0.60 in. (dimension 'A'). If necessary, adjust turnbuckle after slackening locknuts. Bell crank lever rods have left-hand threads.



1974

To ensure that sufficient length of thread is engaged in brake cylinder pull rod, check that length of exposed thread between end of pull rod and hexagon on cylinder pull rod does not exceed 0.50 in. (dimension 'B').

Finally, with all locknuts tightened except locknut on brake cylinder side of turnbuckle, adjust rods until all free play in linkage is eliminated and bell crank lever is centralized in slot of actuator support.

After installing brake cylinder gaiters with vent at bottom, adjust rear brakes.

On later vehicles, turnbuckles are not used and linkage should be adjusted by rotating brake cylinder pull rod hexagon until all free play is eliminated and bell crank lever is centralized in slot in actuator support. Brake shoes must be adjusted hard against drums and parking brake released with system fully charged before adjustment is carried out.

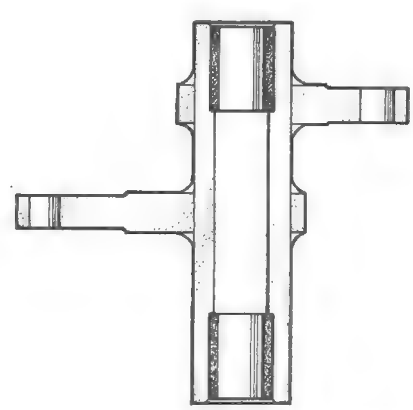
86b PARKING BRAKE LINKAGE – Bush Renewal

The relay and bell crank lever bushes are of non-metallic material and replacement bushes do not require reaming on assembly. A bearing is located in the bell crank lever slot.

Replacement bushes must be pressed into levers until they contact shoulder.

Before reassembly, liberally smear bushes and fulcrum pins with recommended grease.

When installing levers, position rubber washers between top of levers and support, and steel washers between bottom of levers and support.



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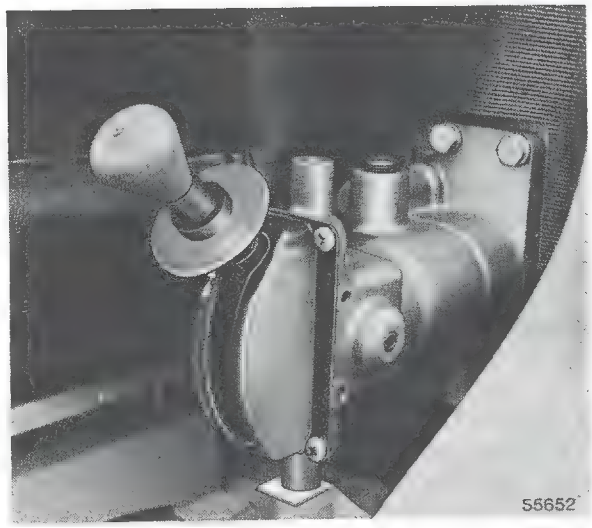
87 CLAYTON DEWANDRE PARKING BRAKE CONTROL VALVE

The parking brake control valve, mounted by the driver's seat, is supplied with air from the secondary reservoir. When the control valve lever is in the 'RELEASE' position, compressed air is passed to the spring brake actuator to release the brakes. When the control valve lever is in the 'PARK' position, air from the spring brake actuator supply line is exhausted through the control valve, and the rear brakes are applied by spring pressure.

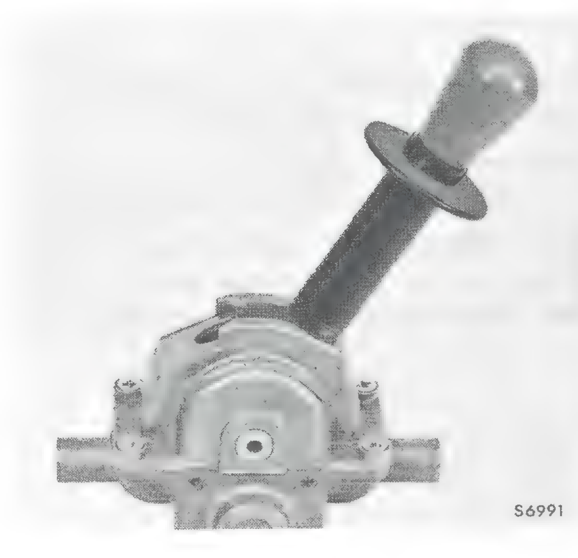


S5652

Two types of Clayton Dewandre parking brake control valve have been used, the earlier valve being Type APGA 6377/1B and the later Type APGA 6337E.

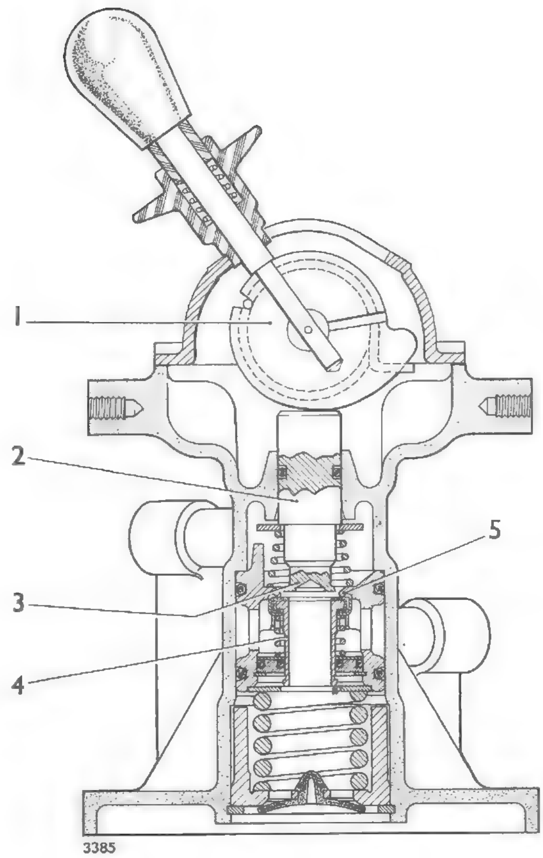
On Models EOL, EOM, EON and POK the earlier valve Type APGA 6377/1B must only be replaced with the later valve Type APGA 6337E or a Westinghouse valve Type KY 932-5/6. The later Clayton Dewandre valve is interchangeable with the Westinghouse valve.

The later Clayton Dewandre valve may be identified by means of the cast alloy cover.

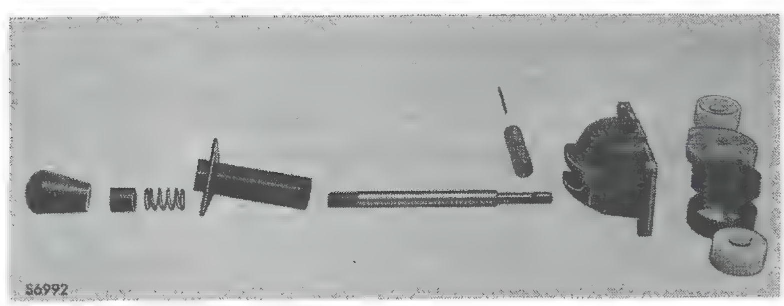


S6991

The earlier type valve consists of a body containing a lever assembly which operates a piston (2) by means of a cam (1). As the lever is moved towards the 'RELEASE' position, the cam depresses the piston and causes the exhaust seat (3) on the piston to close on an inlet/exhaust valve (4). Further movement of the piston causes the inlet/exhaust valve to move away from the seat in the valve carrier (5) and allows air to pass to the spring brake actuator.



The later type valve is similar in construction except for the cam which is spring-loaded.



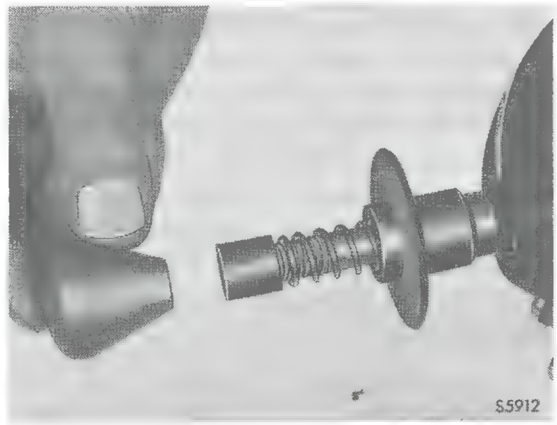
The air pressure delivered by the valve is proportional to the effort applied to the lever and the valve imparts a reaction relative to the movement of the lever so that the driver can sense the degree of brake application.

When the control valve lever is moved towards the 'PARK' position, the inlet valve closes and the exhaust valve opens to allow air from the spring brake actuator supply line to exhaust through the exhaust diaphragm.

Operation of early type parking brake control valve may be checked by disconnecting air line to change-over valve at control valve and installing a pressure gauge in valve port.

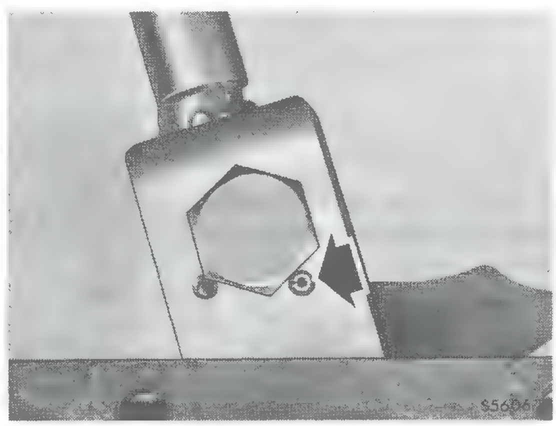
With system fully charged, lift plunger and move lever approximately 15° from 'PARK' towards 'RELEASE' position when gauge should register between 0–0.3 bar (0–5 lb/sq in.)
If pressure is not within limits valve must be adjusted.

To adjust valve, unscrew lever knob and withdraw spring seat and spring.



Before removing plunger and cover, lift plunger and move lever approximately 15° from 'PARK' towards 'RELEASE' position. Withdraw plunger and cover without moving lever.

Remove roller pivot locking pin (arrowed) and turn hexagon until gauge registers a pressure between 0–0.3 bar (0–5 lb/sq in.). After adjustment, install locking pin in hole adjacent to a flat on hexagon and assemble cover and plunger mechanism.



If correct pressure setting cannot be obtained by adjusting roller pivot, valve must be removed and number of shims in spring retainer increased or decreased before repeating adjustment procedure.

Move lever to several positions between 'PARK' and 'RELEASE' and check that gauge registers pressure graduation promptly and in accordance with lever movement. Move lever towards 'RELEASE' position until slight resistance is felt and check that gauge registers approximately 5.9 bar (85 lb/sq in.).

With lever in 'RELEASE' position gauge should register reservoir pressure.

Operation of later type valve may be checked by fully charging air system and moving lever slowly towards 'PARK' position. Lever should be well away from 'RELEASE' end of cover before valve exhausts any air. When lever is approximately 13° away from 'PARK' position all air should have been exhausted from spring brake actuators.

87b CLAYTON DEWANDRE PARKING BRAKE CONTROL VALVE – Leakage Test

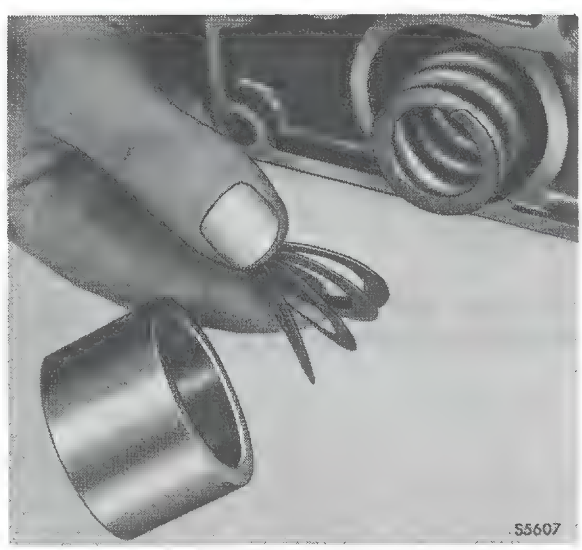
Both types of valve are more readily checked for leakage when removed from the vehicle.

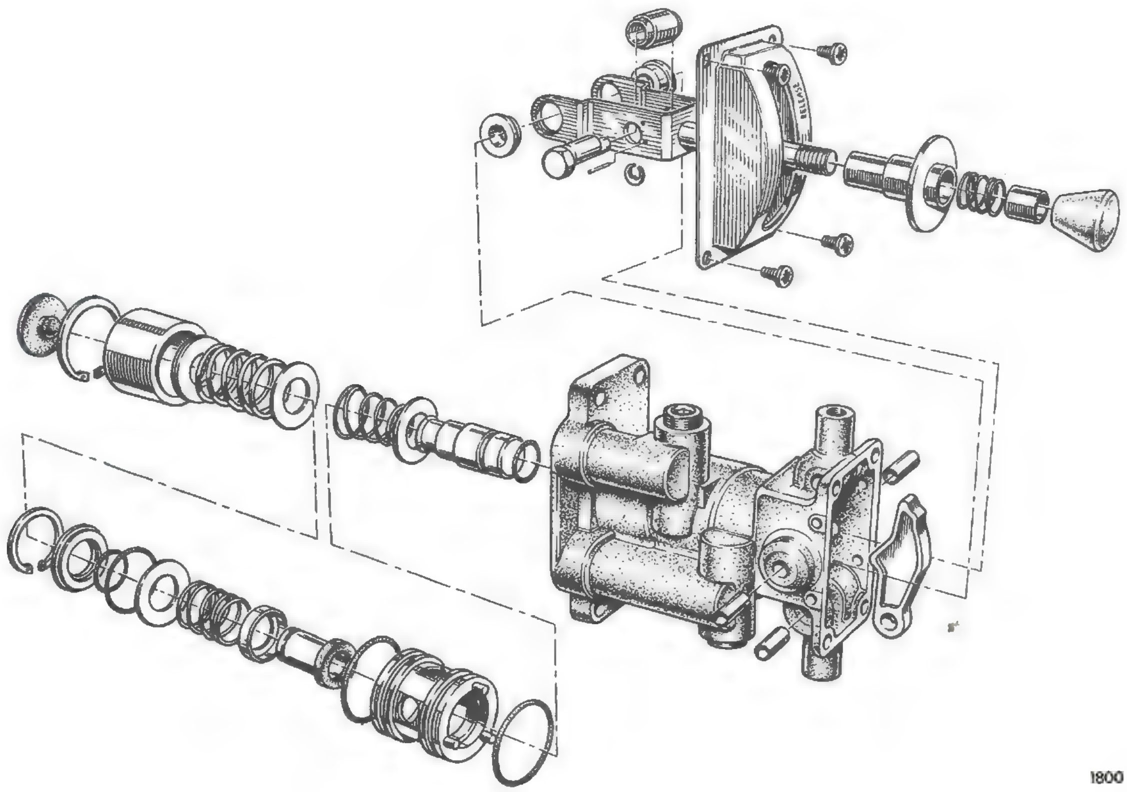
With lever in 'PARK' position, smear soap solution over exhaust diaphragm and delivery port, and apply an air line of 6.9 bar (100 lb/sq in.) to supply port. Leakage in excess of a ½ in. soap bubble in ten seconds indicates a faulty inlet/exhaust valve or seat, or defective valve carrier or valve guide sealing rings.

With lever in 'RELEASE' position, smear soap solution over exhaust diaphragm and supply port, and apply an air line of 6.9 bar (100 lb/sq in.) to delivery port. Leakage in excess of a ½ in. soap bubble in ten seconds indicates a faulty inlet/exhaust valve, or exhaust seat on piston.

87c CLAYTON DEWANDRE PARKING BRAKE CONTROL VALVE – Disassembly

After removing exhaust diaphragm, depress spring retainer and remove circlip. Note number of shims which may be present in retainer.





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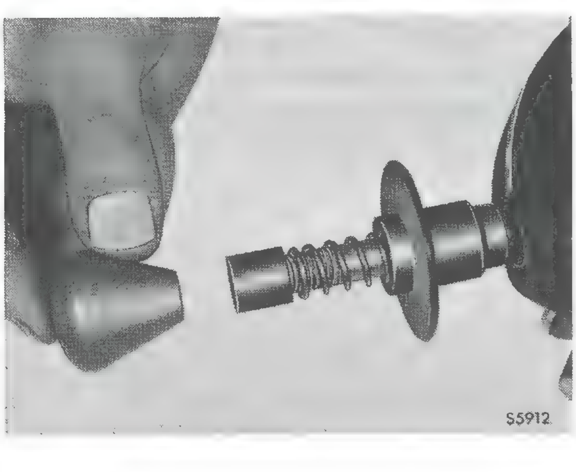
With spring removed, spring seat, valve carrier, piston return spring and seat, and piston may be withdrawn.

Valve guide, seal retainer, spring, valve support and inlet/exhaust valve may be withdrawn from carrier after removal of circlip.

If the reason for disassembling control valve is leakage due to defective sealing rings or springs, valve need not be disassembled further. However, if pivot pins, bushes, roller or cam are worn or broken, valve cover must be removed.

Spring seat, spring and plunger may be removed by unscrewing lever knob.

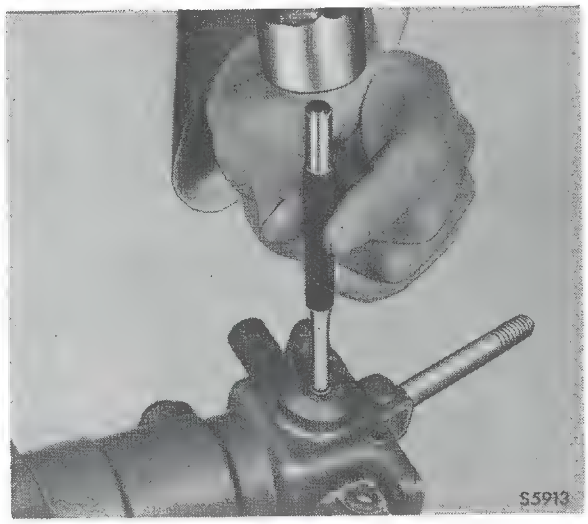


S5912

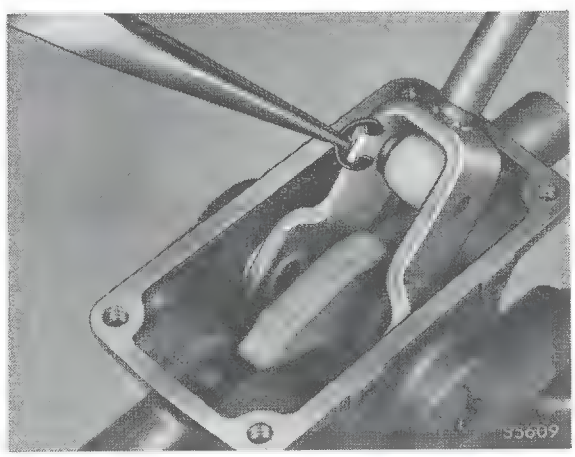
On early type valves, mark position of cover in relation to valve body before removal.

Before driving out cam pivot pin, mark position of split side of pin in relation to valve body.

Lever assembly may be withdrawn by driving pivot pins into body. Mark position of split side of pins in relation to body before removal and mark also side of body adjacent to roller pivot hexagon.

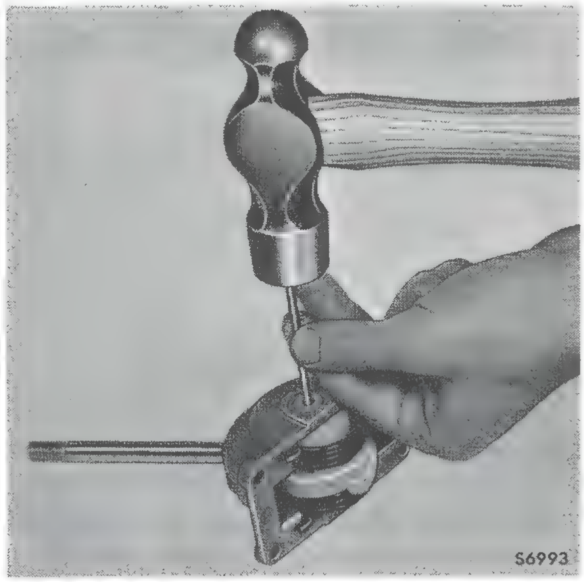


Before removing circlip retaining roller pivot, mark flat on hexagon adjacent to locking pin in lever.



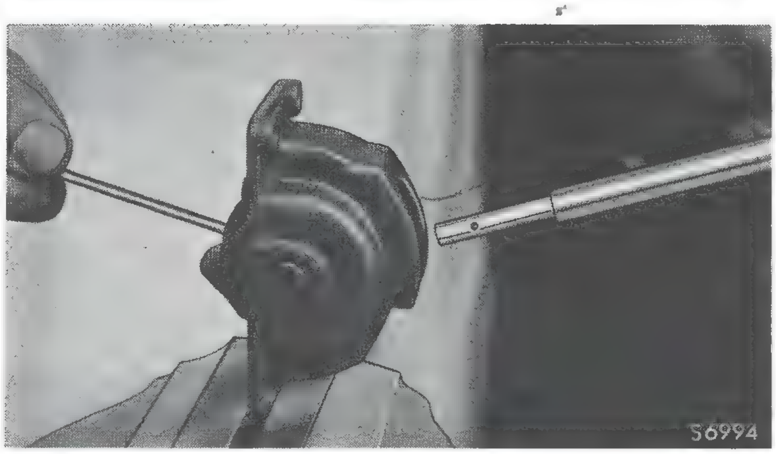
On later type valves, cover and lever assembly may be withdrawn after removal of cover attaching screws.

Lever may be withdrawn after driving out spring pin through centre of cam pivot pin.



Insert a rod in hole in underside of cam to relieve spring tension when removing lever.

Cam, spring and spacers may be withdrawn from cover after removal of pivot pin.



87d CLAYTON DEWANDRE PARKING BRAKE CONTROL VALVE — Inspection

Discard components which will be renewed from a repair kit and thoroughly clean all other parts.

Examine sliding surfaces of valve carrier and piston for excessive wear or scores and inspect plunger for wear on end which contacts valve cover.

Check that cam and roller are free from flats or burrs. Roller should be a close fit in pivot pin but turn freely.

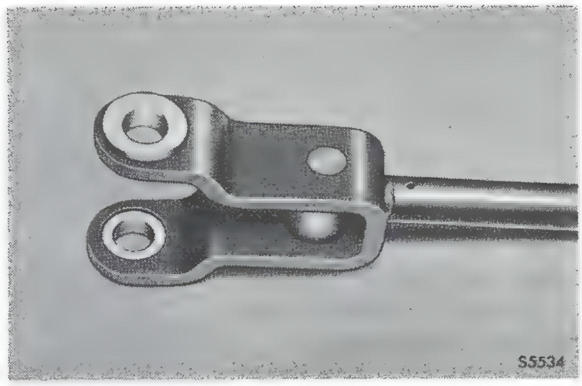
87e CLAYTON DEWANDRE PARKING BRAKE CONTROL VALVE — Reassembly

Before reassembly, liberally smear working surfaces of cam, lever bushes, piston, valve carrier, sealing rings and springs with recommended grease.

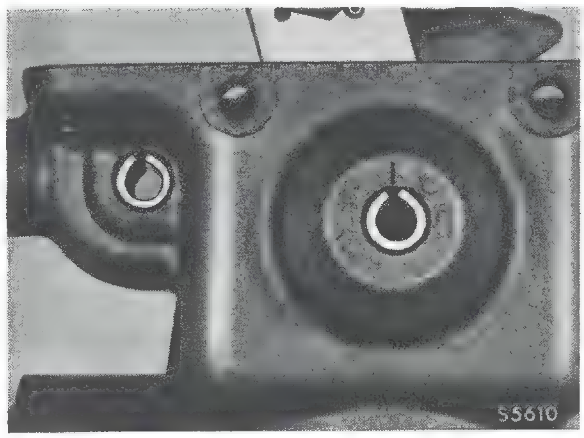
On early type valves, when installing cam in valve body, ensure split side of pin is adjacent to mark made on disassembly.

When assembling roller to lever ensure marked side of pivot pin hexagon is adjacent to locking pin.

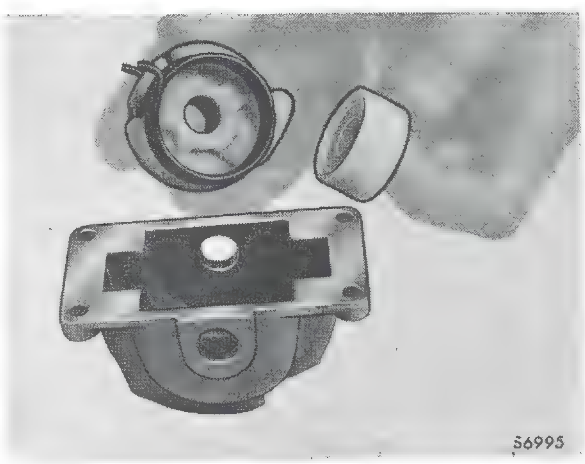
Press bushes into lever so that bush collars are on outside, and position lever with hexagon adjacent to marked side of body.



When installing lever pivot pins, ensure split side is adjacent to marks made on disassembly. Do not install cover at this stage.

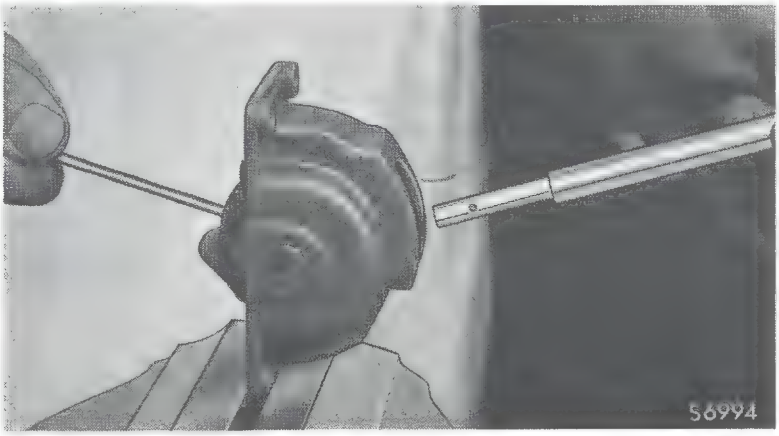


On later type valves, insert straight portion of spring into notch in cam and turn cam so that it is contained within coils of spring. A spacer is located each side of the cam.



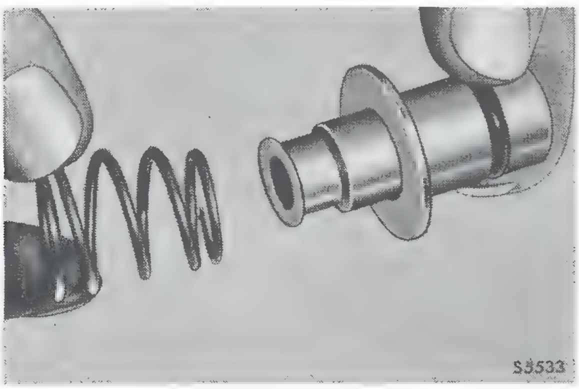
Before retaining cam and spring in cover by means of pivot pin, ensure legs of spring contact cover on 'RELEASE' side.

Insert drift in hole in cam from inside cover and rotate cam against spring pressure until lever can be installed.

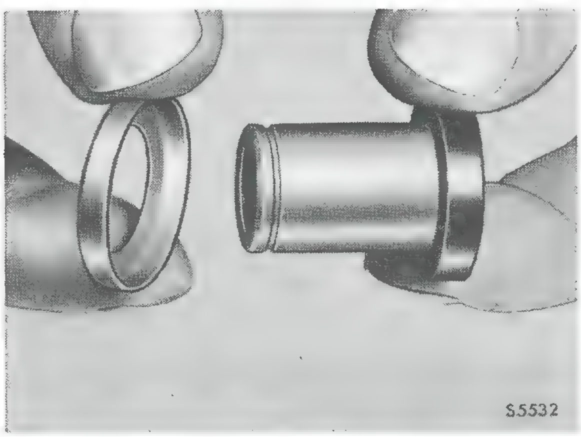


After securing lever with spring pin, assemble plunger, spring, spring seat and knob.

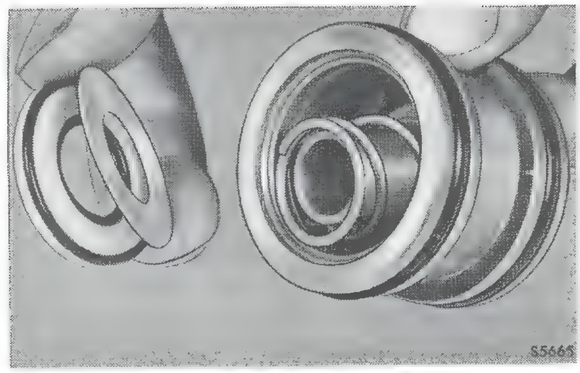
On both valves, place spring seat on piston and install spring with smaller end to seat. Place lever in 'PARK' position and insert assembly into body.



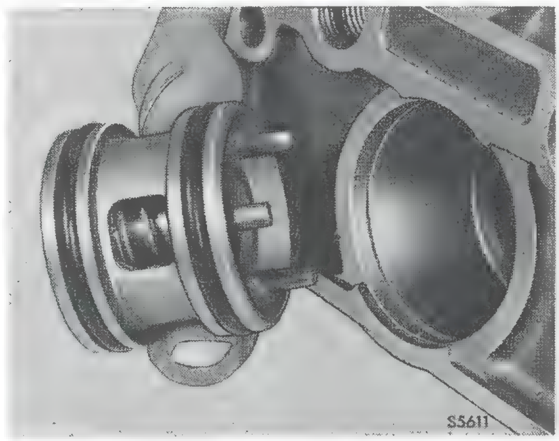
Place valve support over inlet/exhaust valve and position assembly in valve carrier.



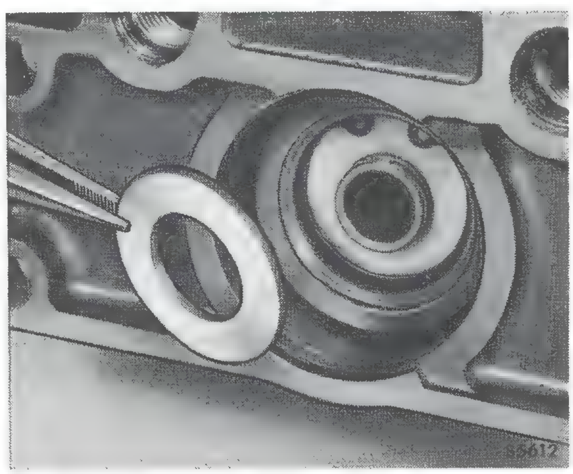
Place spring, seal retainer and guide over valve and install circlip.



Insert valve carrier into body with spigotted end towards piston.



Before installing spring retainer locate spring seat in valve carrier and insert any shims found on disassembly into retainer.

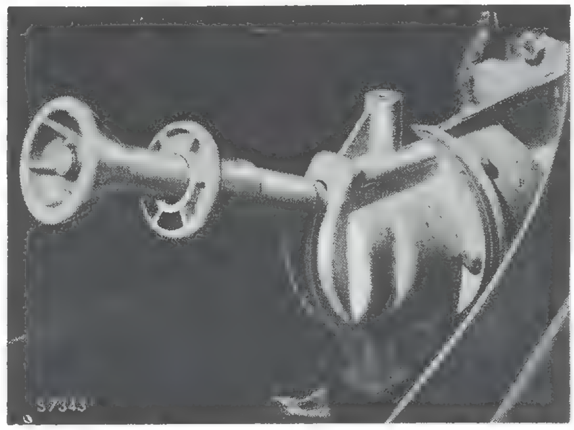


Before installing control valve carry out leakage test.

Carry out operating test on early type valves before assembling cover, plunger, spring, spring seat and knob.

88 WESTINGHOUSE PARKING BRAKE CONTROL VALVE

The parking brake control, mounted by the driver's seat, is supplied with air from the secondary reservoir. When the control valve handle is in the 'OFF' position, compressed air is passed to the spring brake actuator to release the brakes. When the control valve handle is in the 'PARK' position, air from the spring brake actuator supply line is exhausted through the control valve, and the rear brakes are applied by spring pressure.



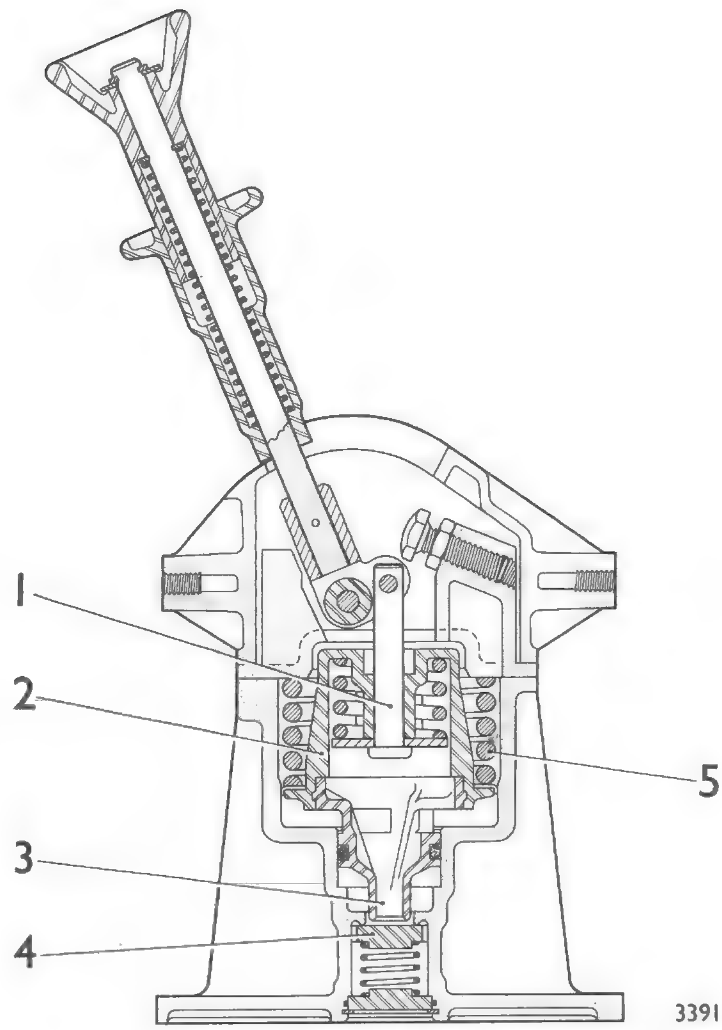
The Westinghouse valve Type KY 932-5/6 is interchangeable with the later Clayton Dewandre valve Type APGA 6337E.

The earlier Clayton Dewandre valve Type APGA 6377/1B can be replaced by the Westinghouse valve.

The valve body houses a spring-loaded piston (2), the movement of which is controlled by a plunger (1) attached to the operating handle. The handle has a spring-loaded sleeve which acts as a locking device when the handle is moved into the 'PARK' position.

When the handle is moved to the 'OFF' position, the plunger travels downwards, followed by the piston assembly. The piston exhaust stem (3) meets the inlet valve (4) and closes the exhaust opening. Progressive downward movement of the piston opens the inlet valve, allowing air to travel to the spring brake actuator, thereby gradually releasing the brakes.

The air pressure passed to the spring brake also acts on the lower surface of the piston. This exerts a force to react against the main piston spring (5), enabling intermediate balance points to be achieved where both inlet and exhaust valves are closed and partial spring brake application is obtained.



The air pressure delivered by the valve is proportional to the effort applied to the handle and the valve imparts a reaction relative to the movement of the handle so that the driver can sense the degree of brake application.

When the control valve handle is moved towards the 'PARK' position, the inlet valve closes and the exhaust valve opens to allow air from the spring brake actuator to escape through the exhaust port.

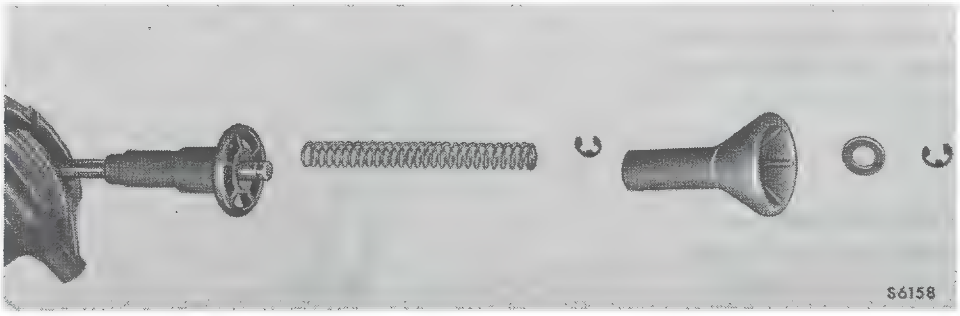
88a WESTINGHOUSE PARKING BRAKE CONTROL VALVE

Operating Test and Adjustment

Operation of parking brake control valve may be checked by disconnecting spring brake actuator supply air line at control valve and substituting Gauge VR2047. Charge system until secondary reservoir pressure indicated on vehicle dual air gauge is 7.9 bar (115 lb/sq in.). With control valve handle held in 'OFF' position check that test gauge registers a pressure of 6.5–7.2 bar (95–105 lb/sq in.).

If pressure is not within these limits, valve lever stop bolt must be adjusted.

88a WESTINGHOUSE PARKING BRAKE CONTROL VALVE— Operating Test and Adjustment (contd)



S6158

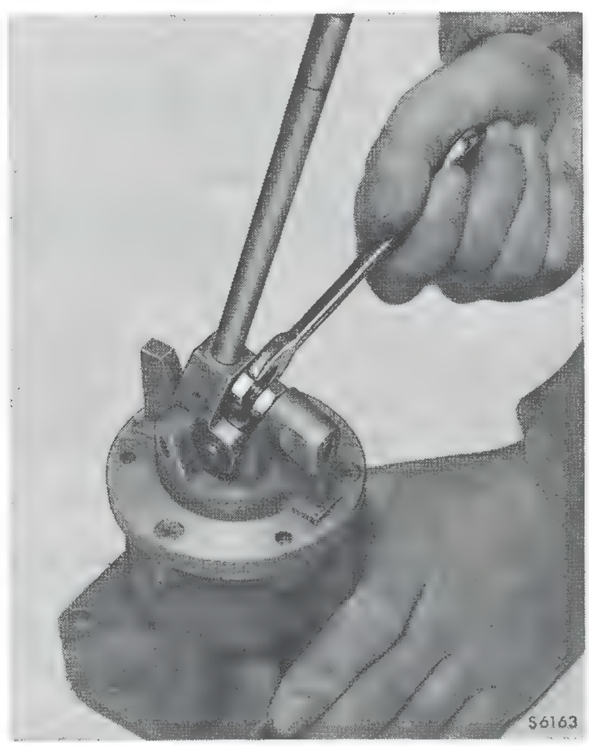
Access to stop bolt is gained by removing handles and valve cover. Handles and spring are retained by circlips.

With system fully charged adjust stop bolt so that when lever is held against bolt, pressure registered on test gauge is between 6.5–7.2 bar (95–105 lb/sq in.).

Move lever to several positions between 'PARK' and 'OFF' and check that gauge registers a change in pressure promptly and in accordance with lever position.

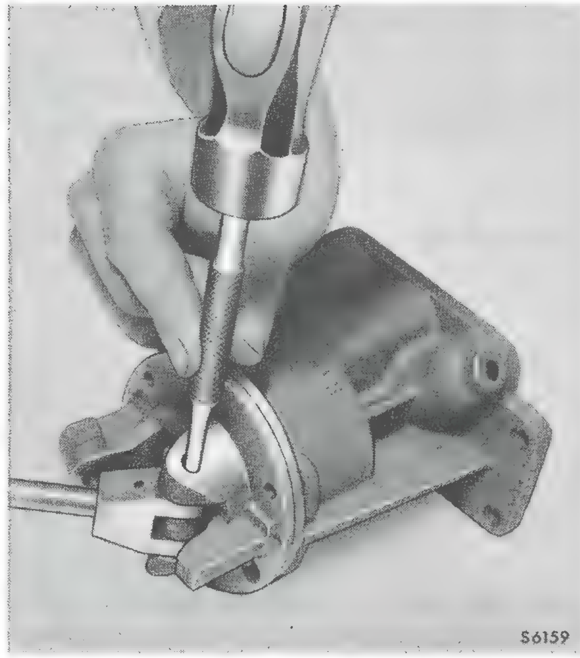
88b WESTINGHOUSE PARKING BRAKE CONTROL VALVE – Disassembly

With cover removed, hold lever in 'PARK' position and remove stop bolt.



S6163

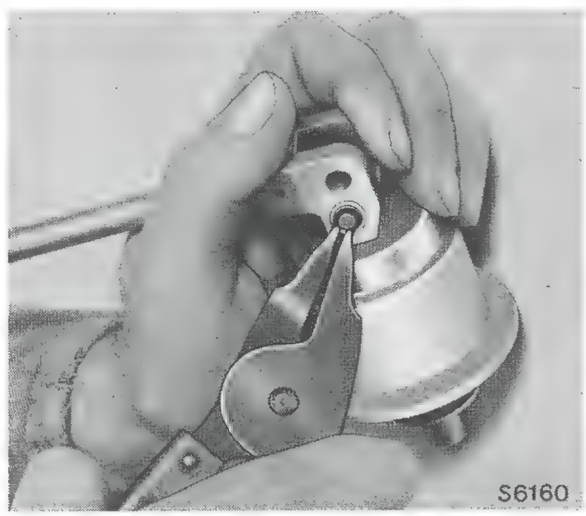
Lever roller may be removed after driving out lever pivot pin.



Before removing retaining plate screws, mark plate in relation to valve body. Plate will be under pressure of main spring and care must be taken to restrain plate while removing screws.

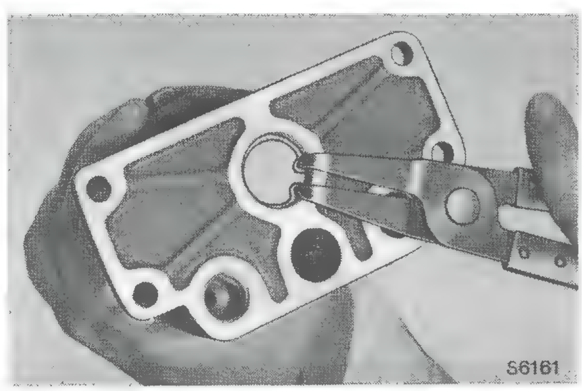
After removing retaining plate, main spring, lever and piston assembly may be withdrawn.

Lever may be detached from piston after removing pivot pin. Pin pivots in elongated holes in lever to prevent side loading of piston assembly.



If required, piston assembly may be disassembled by prising lower cover out of piston body.

Access to inlet valve and spring is achieved by removing circlip and plug in base of control valve.



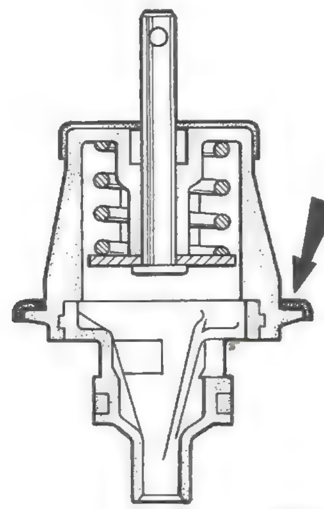
Discard all components which will be renewed from a repair kit.

Before assembly check lever roller for flats or burrs and sliding surfaces of body and piston for scores.

Lubricate all load bearing and sliding surfaces, including seals with recommended grease.

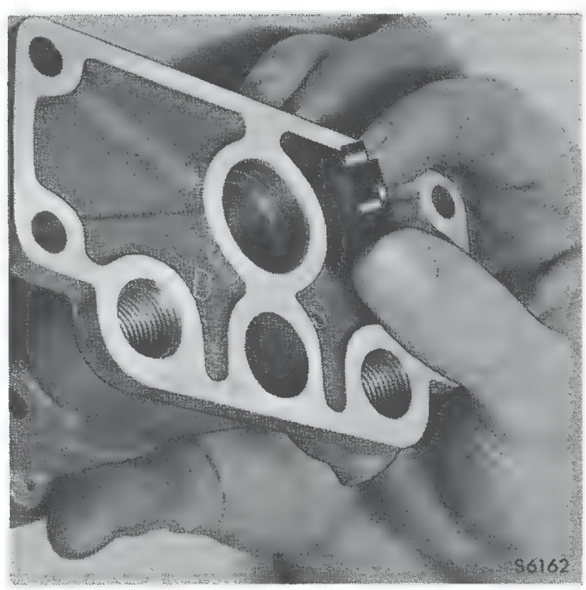
Assemble seal (arrowed) over piston so that flat side of seal will be in contact with spring.

When installing retaining plate, threads of countersunk screws must be smeared with Loctite Nut-Lock.



3527

Install inlet valve flat side first so that projection on valve will locate spring.

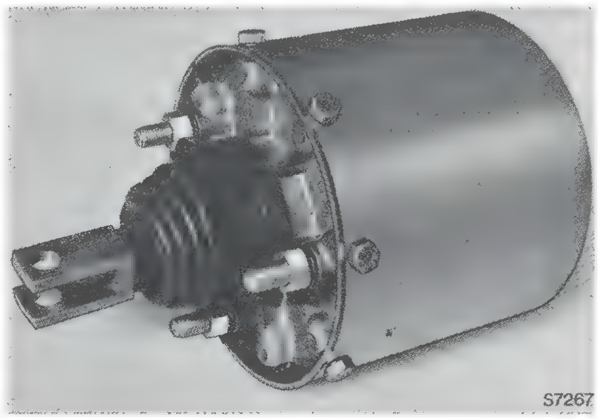


Before installing valve cover, adjust delivery pressure as described in Section 88a.

89 CLAYTON DEWANDRE SPRING BRAKE ACTUATOR

The Clayton Dewandre spring brake actuators used are completely interchangeable with the corresponding Westinghouse spring brake actuators, according to model usage.

The Clayton Dewandre actuator may be identified by means of the steel cylinder retained by bolts.

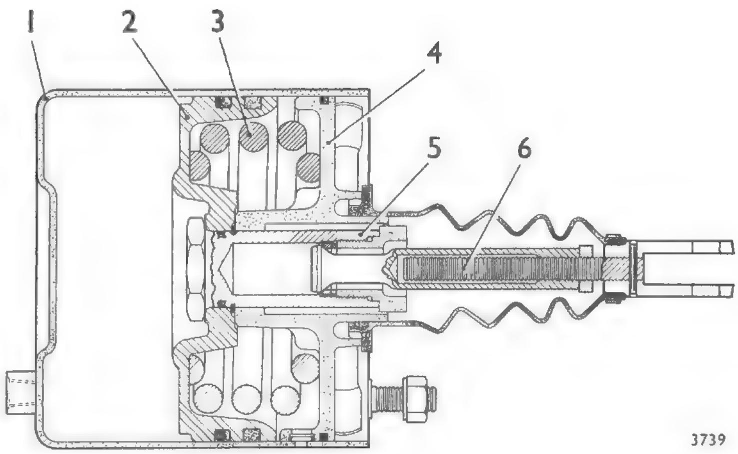


The spring brake actuator is attached to the rear axle housing and operates the rear brakes via a mechanical linkage.

The actuator consists of a cylinder (1) and body (4) containing a piston (2), spring (3), piston shaft (5) and pull rod (6).

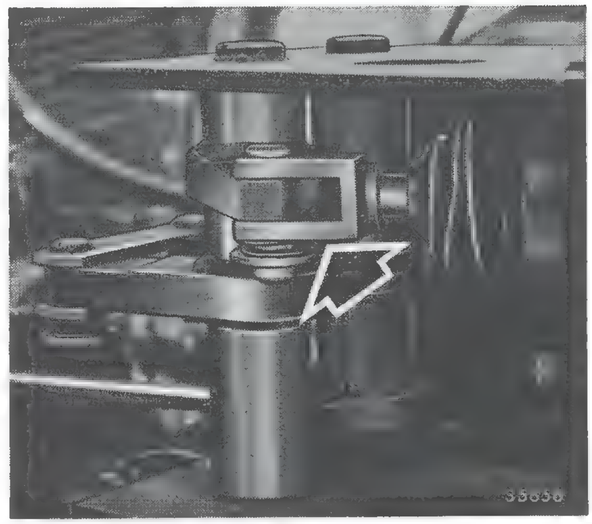
When the parking brake control valve lever is in the 'OFF' or 'RELEASE' position air is supplied to the actuator cylinder and moves the piston to compress the spring. Movement of the piston is transferred to the pull rod and brake linkage to release the brakes.

When the control valve lever is in the 'PARK' position, air is exhausted from the cylinder and the spring moves the piston and linkage to apply the brakes.



89a CLAYTON DEWANDRE SPRING BRAKE ACTUATOR – Removal

Before removing actuator attaching bolts, fully charge air system and release parking brake to enable actuator clevis pin to be withdrawn.



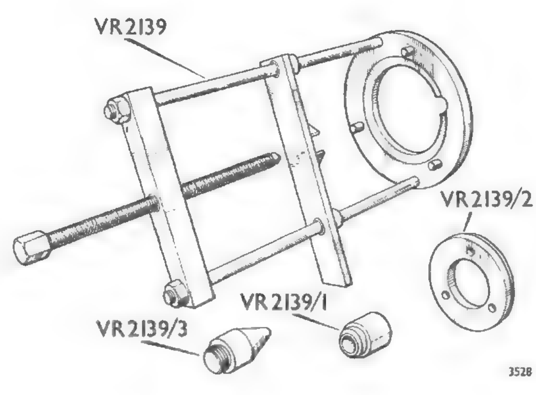
Move parking brake control valve lever slowly to 'PARK' position before disconnecting hose from actuator cylinder.

89b CLAYTON DEWANDRE SPRING BRAKE ACTUATOR – Disassembly

Under no circumstances should any attempt be made to disassemble a spring brake actuator without the use of Compressor VR2139.

The compressor is used in conjunction with Adaptor VR2139/2 and Pilot VR2139/3 for Clayton Dewandre actuators.

The compressor and Adaptor VR2139/1 are required for Westinghouse actuators.

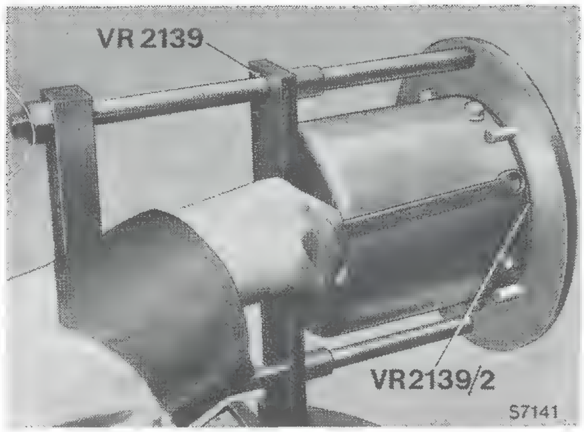


Threads of compressor thrust screw must be kept lubricated with Rocol Anti-scuffing Paste or equivalent.

Clevis rod and gaiter may be removed after slackening pull rod nut. Lock nut is exposed by releasing clip and sliding gaiter along clevis rod. If necessary, clevis may be unscrewed from rod after removing locking pin.

Assemble actuator and Adaptor VR2139/2 to Compressor VR2139 and adjust thrust screw until compressor support contacts actuator cylinder.

Mark position of body in relation to cylinder before removing attaching bolts.



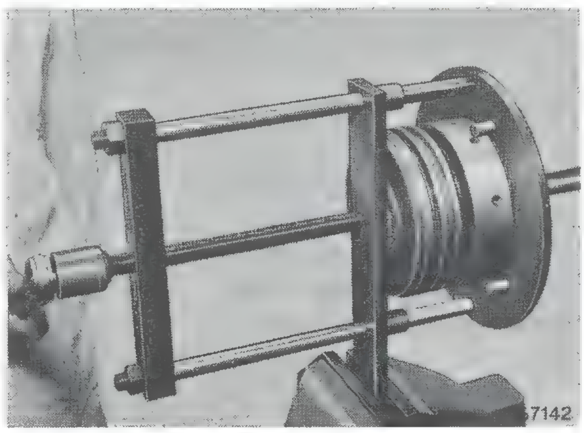
Slowly release compressor while lightly tapping cylinder and confirm that cylinder is not under spring pressure.

If cylinder is under spring pressure, compressor must be carefully released until pressure is relieved.

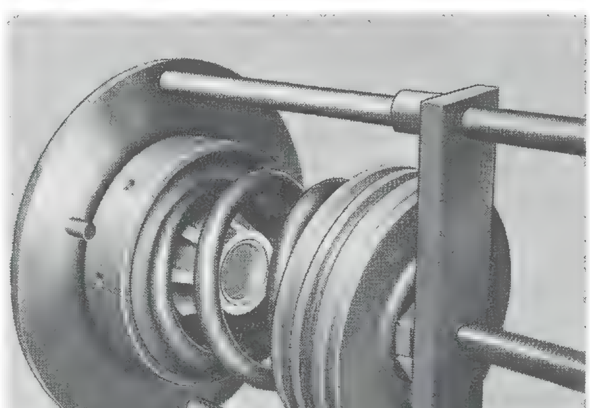
If no movement of cylinder occurs, progressively apply air pressure to inlet port while tapping cylinder and releasing compressor slowly until seal extrudes from cylinder.

Remove and discard cylinder drain flap.

Reassemble unit and Adaptor to compressor, ensuring that hexagonal head of piston shaft engages compressor support, and fully compress spring.



After unscrewing pull rod seat retainer and removing pull rod assembly, slowly release compressor and remove body, spring, piston and piston shaft.



Shaft may be withdrawn from piston after removing circlip.

89c CLAYTON DEWANDRE SPRING BRAKE ACTUATOR – Inspection

Discard all components which will be renewed from a repair kit.

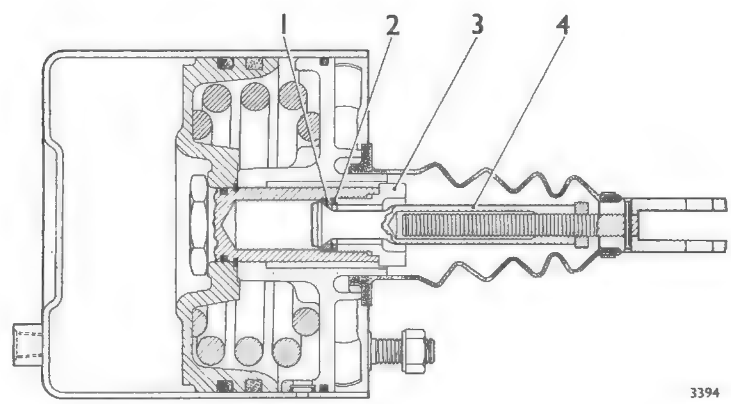
Slight corrosion in cylinder may be removed with very fine sanding paper, but a scored or damaged cylinder must be renewed.

Examine pull rod and clevis for wear or damage especially on the threaded portions.

89d CLAYTON DEWANDRE SPRING BRAKE ACTUATOR – Reassembly

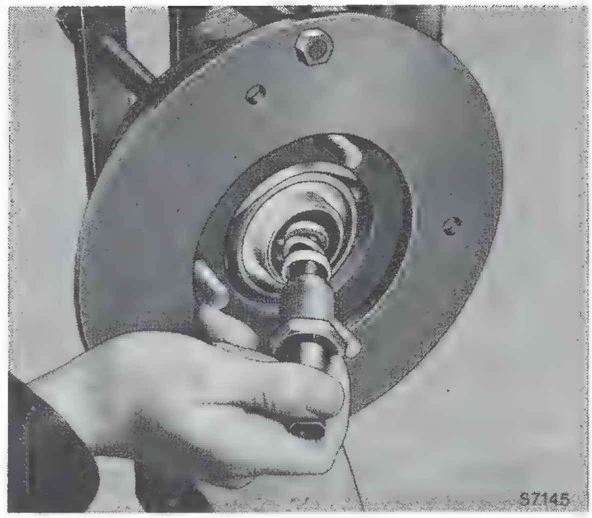
Before reassembly coat sliding surfaces of cylinder, piston, piston shaft and seals, spring and pull rod with recommended grease. Soak piston lubricator wick for 30 minutes in recommended oil.

When assembling pull rod seat (1), slip washer (2) and seat retainer (3) to pull rod (4) ensure chamfered side of seat contacts flared end of pull rod.



Before assembling body, spring and piston in compressor, screw Pilot VR2139/3 into piston shaft to facilitate entry of shaft into actuator body.

Smear threads of seat retainer with Loctite Screw Lock before installation.



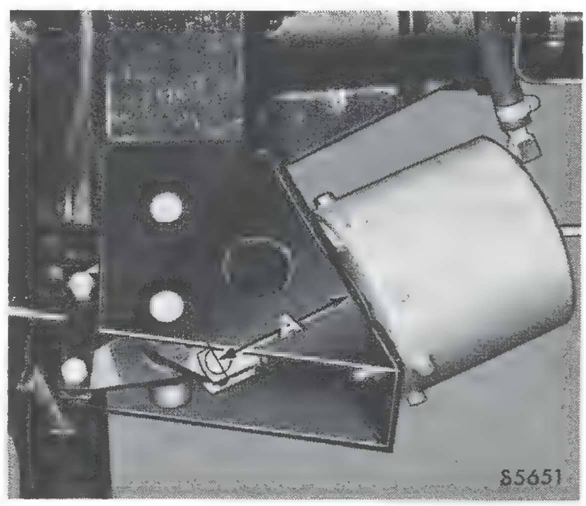
Before installing cylinder, ensure piston lubricator wick is positioned in groove nearest body.

Align marks made on disassembly and tighten bolts to specified torque.

Assemble gaiter and clevis but do not tighten locknut until adjustment of clevis rod has been carried out.

89e CLAYTON DEWANDRE SPRING BRAKE ACTUATOR – Installation

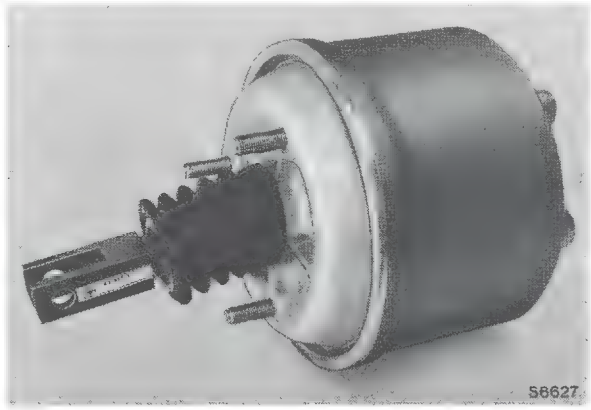
Before connecting actuator clevis, fully charge air system and move parking brake control valve lever to 'OFF' or 'RELEASE' position. Pull clevis rod out of actuator to full extent of its travel and adjust rod until dimension 'A', between actuator body and centre of clevis pin hole, is 5.88 in.



90 WESTINGHOUSE SPRING BRAKE ACTUATOR

The Westinghouse spring brake actuators used are completely interchangeable with the corresponding Clayton Dewandre spring brake actuators, according to model usage.

90 WESTINGHOUSE SPRING BRAKE ACTUATOR (contd)



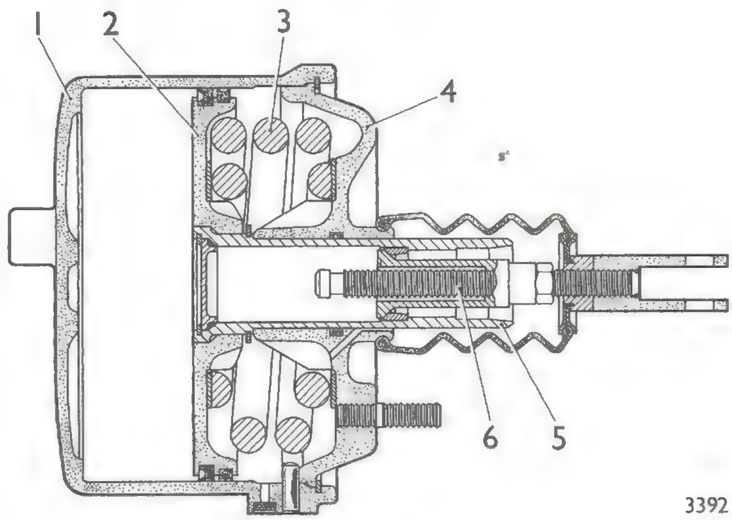
The Westinghouse actuator may be identified by the cast cylinder retained by a circlip.

The spring brake actuator is attached to the rear axle housing and operates the rear brakes via a mechanical linkage.

The actuator consists of a cylinder (1) and body (4) containing a piston (2) spring (3), piston shaft (5) and pull rod (6).

When the parking brake control valve lever is in the 'OFF' or 'RELEASE' position air is supplied to the actuator cylinder and moves the piston to compress the spring. Movement of the piston is transferred to the pull rod and brake linkage to release the brakes.

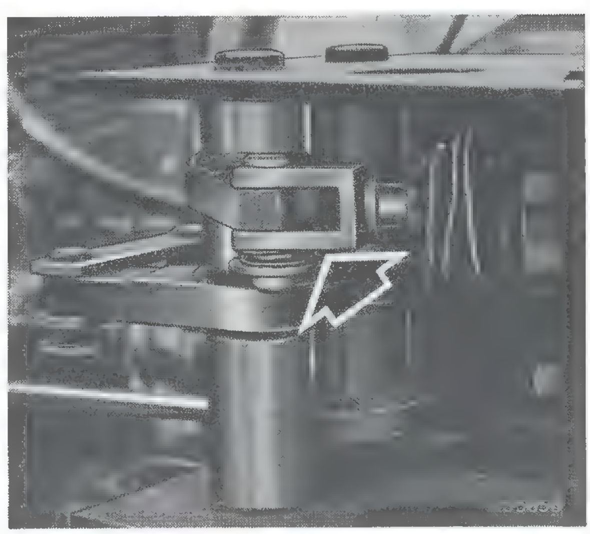
When the control valve lever is in the 'PARK' position, air is exhausted from the cylinder and the spring moves the piston and linkage to apply the brakes.



3392

90a WESTINGHOUSE SPRING BRAKE ACTUATOR – Removal

Before removing actuator attaching bolts, fully charge air system and release parking brake to enable actuator clevis pin to be withdrawn.



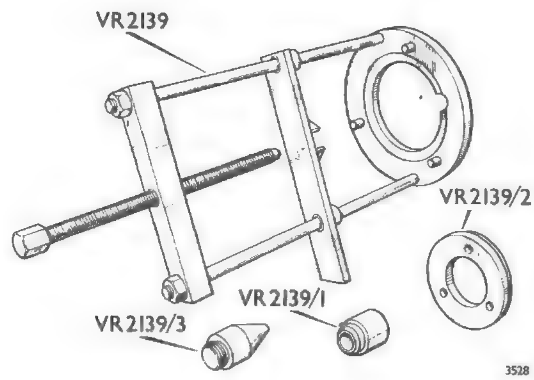
Move parking brake control valve lever slowly to 'PARK' position before disconnecting hose from actuator cylinder.

90b WESTINGHOUSE SPRING BRAKE ACTUATOR – Disassembly

Under no circumstances should any attempt be made to disassemble a spring brake actuator without the use of Compressor VR2139.

The compressor is used in conjunction with Adaptor VR2139/1 for Westinghouse actuators.

The compressor with Adaptor VR2139/2 and Pilot VR2139/3 are required for Clayton Dewandre actuators.

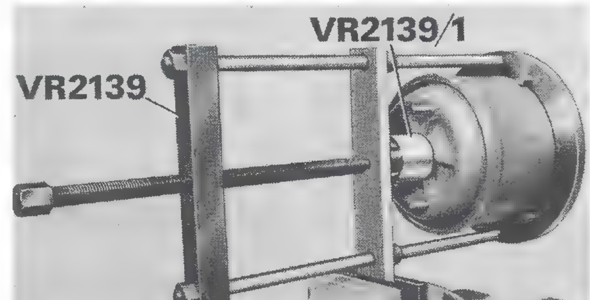


Threads of compressor thrust screw must be kept lubricated with Rocol Anti-scuffing Paste or equivalent.

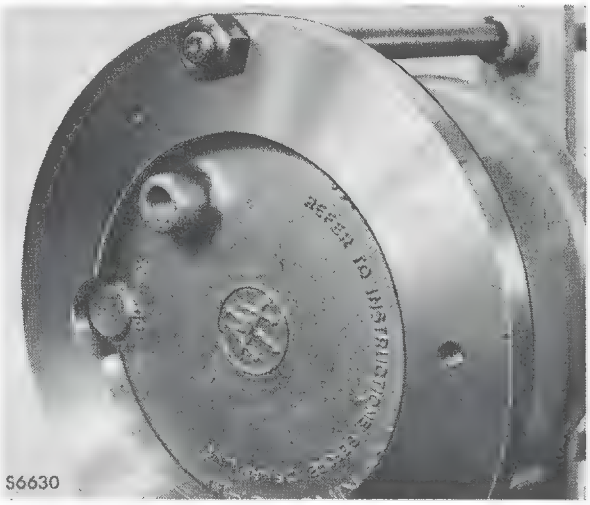
Remove clevis, gaiter and retaining plate from clevis rod and mark position of body in relation to cylinder.

Remove all sealer covering circlip at joint between actuator body and cylinder.

With actuator installed in Compressor VR2139 and using Adaptor VR2139/1, pressure of body against circlip can be relieved, and circlip removed.



Ensure boss on actuator cylinder locates in recess of compressor.

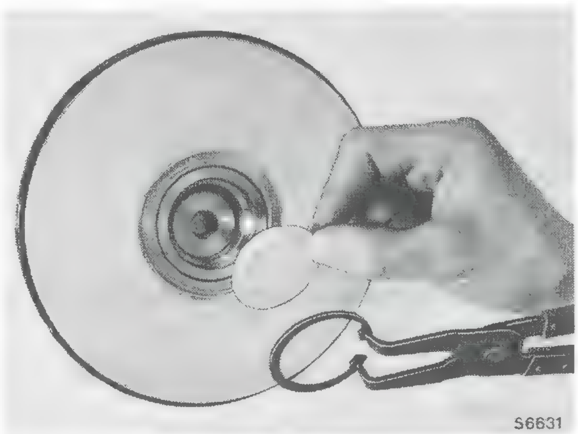


S6630

Actuator body must not be compressed into cylinder more than 0.20 in. or damage to body or cylinder may result.

Piston must be tilted to clear dowel in cylinder before removal.

Clevis pull rod can be withdrawn from piston shaft after circlip, nylon end plate and seal have been removed.



S6631

If required, piston shaft may be withdrawn from piston after removing circlip.

90c WESTINGHOUSE SPRING BRAKE ACTUATOR — Inspection

Discard all components which will be renewed from a repair kit.

Slight corrosion in cylinder may be removed with very fine sanding paper.

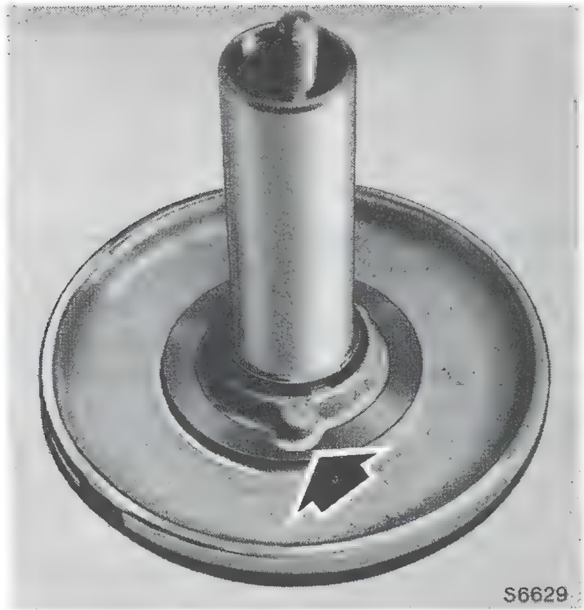
Examine sliding surface of piston shaft and bore in body for scores and corrosion.

Pull rod and clevis must be free from wear or damage especially on the threaded portions.

90d WESTINGHOUSE SPRING BRAKE ACTUATOR — Reassembly

Before reassembly lubricate all sliding surfaces and seals with grease. Piston and piston shaft lubricator wicks must be soaked in engine oil.

Position spring seats on piston and body. Spring seat on piston is recessed.



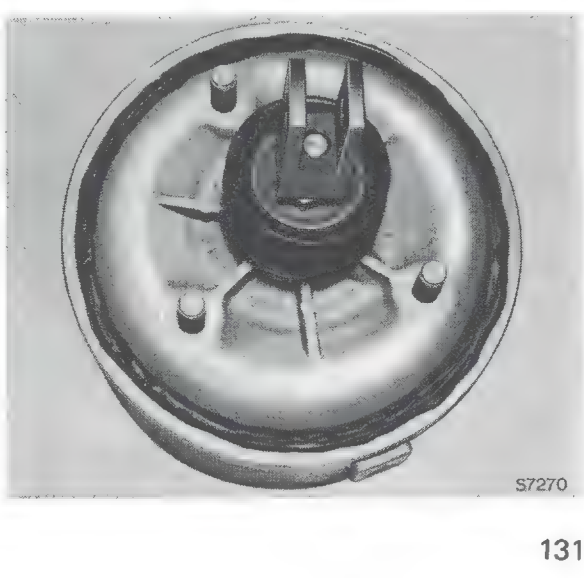
Before installing piston in cylinder, ensure seal is located in groove nearest flat side of piston, with open side of seal facing away from clevis end of piston shaft.

Before assembling body, spring and cylinder in compressor ensure circlip groove in cylinder is clean and free from damage.

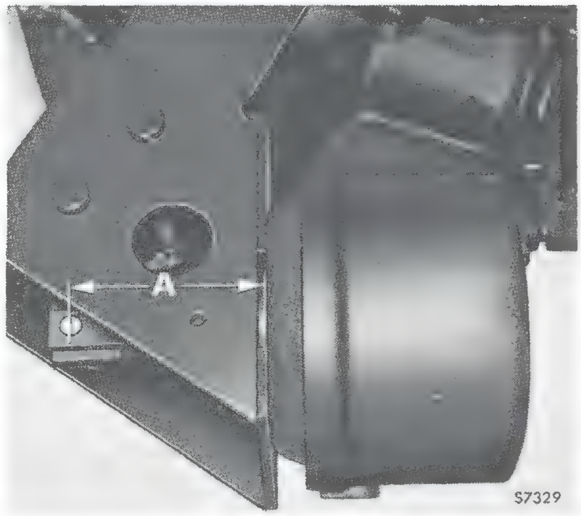
When compressing spring, align marks made on disassembly and ensure slot in body engages dowel in cylinder. Care must be taken to ensure body does not become misaligned with cylinder during compression of spring.

Before releasing compressor, closely examine circlip to ensure that it is correctly and positively located.

Seal actuator body to cylinder joint with Bostik 772. Actuator must remain with circlip groove uppermost while sealer hardens.



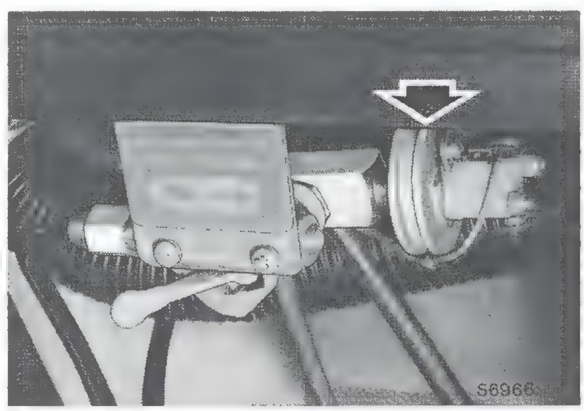
Before connecting actuator clevis, fully charge air system and move parking brake control valve lever to 'OFF' or 'RELEASE' position. Pull clevis rod out of actuator to full extent of its travel and adjust rod until dimension 'A', between actuator body and centre of clevis pin hole, is 5.88 in.

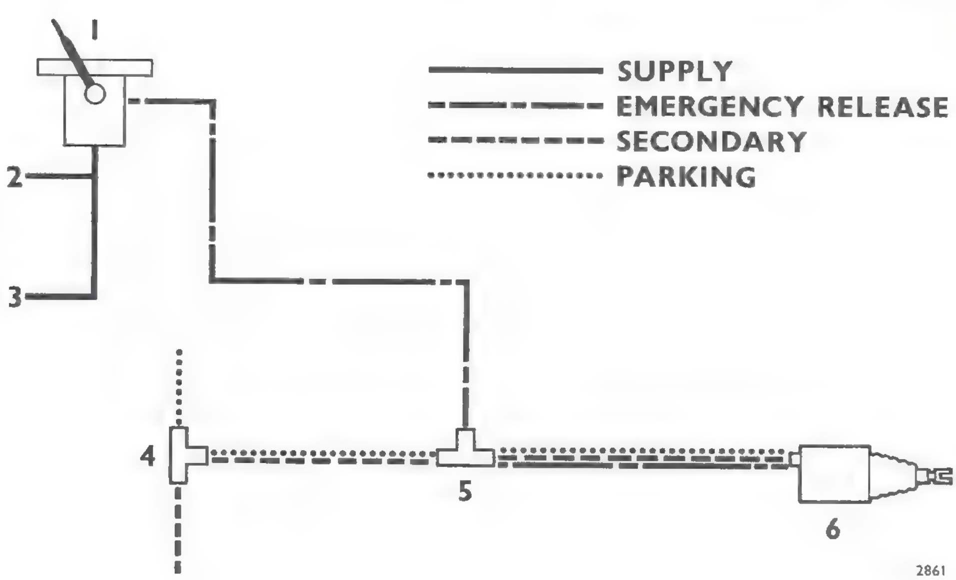


91 EMERGENCY PARKING BRAKE RELEASE

On models built to Code 665 an emergency parking brake release is incorporated in the spring-actuated parking brake system. The emergency release system provides a means of releasing the parking brake in the event of failure of the air supply to the parking brake control valve.

The system is operated by a valve, mounted together with a low pressure warning switch (arrowed), under the instrument panel.





The valve (1) is supplied with air (3) from a separate reservoir and, when operated, delivers air to the spring brake actuator (6) via a change-over valve (5) which is mounted on the chassis sidemember. A supply connection (2) is provided for a low air pressure warning switch and/or gauge to indicate the reservoir pressure.

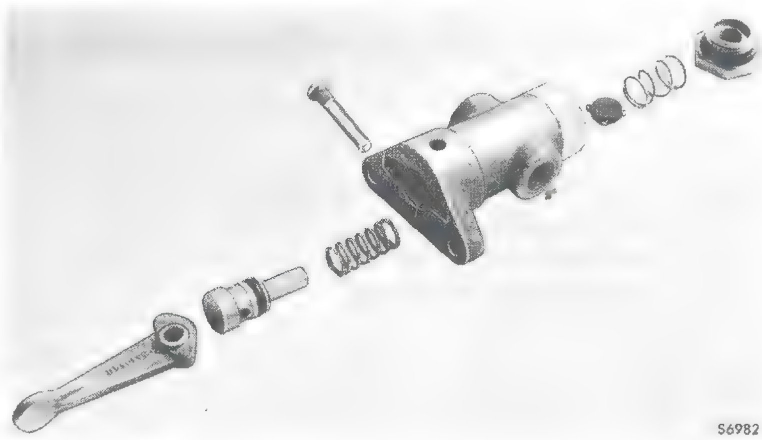
The reservoir is provided with a non-return valve at the supply connection.

Operation and construction of the change-over valve is similar to the change-over valve (4) incorporated in the parking brake system (see Section 82).

91a EMERGENCY RELEASE VALVE – Disassembly

Disc valve and spring may be withdrawn from rear of valve after removal of plug.

Lever, plunger and spring may be withdrawn from valve body after driving out lever pivot pin.



S6982

91b EMERGENCY RELEASE VALVE – Inspection and Reassembly

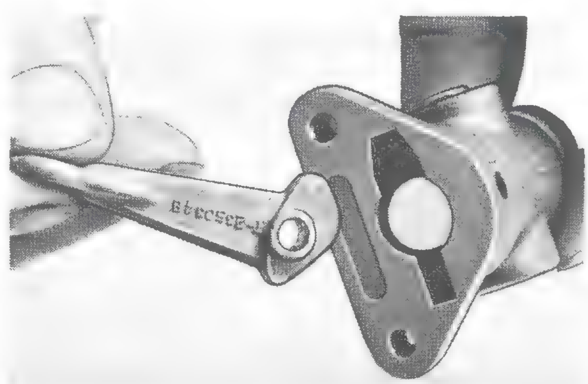
Inspect plunger and plug sealing rings, and disc valve for signs of deterioration and indentation.

Smear sliding surfaces of lever, plunger and pivot pin with grease before reassembly.

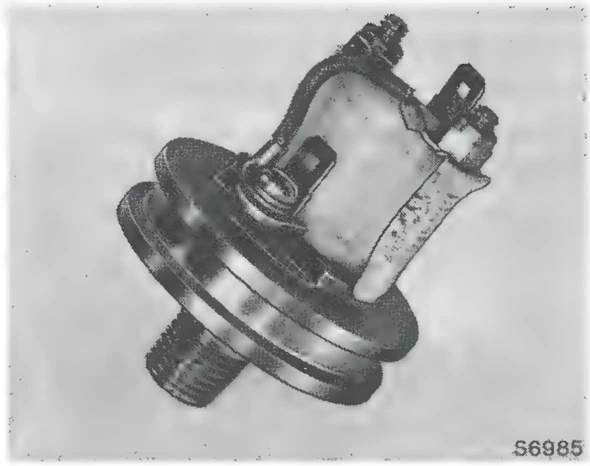
Place disc valve squarely in body before installing larger spring and plug.

Smaller spring locates over plunger.

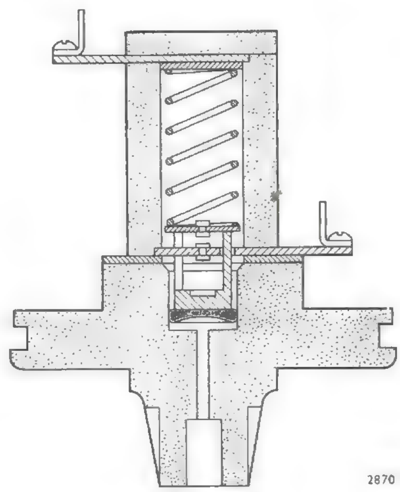
Install lever so that plunger operating lobe is offset towards wider slot in valve body.



S6983



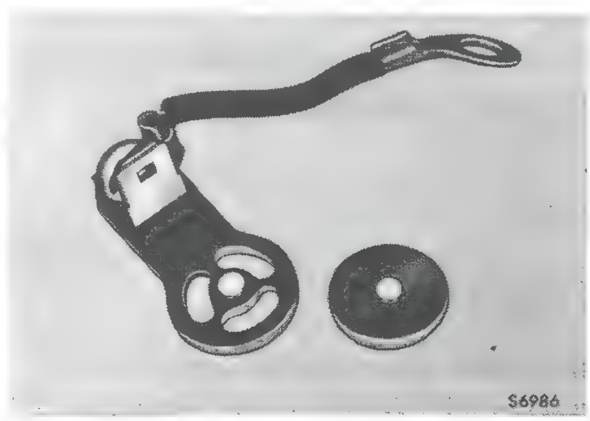
The low pressure warning switch, mounted with the emergency release valve under the instrument panel, consists of a body and cover containing the terminals, return spring, shims and a pair of contacts situated above a piston and diaphragm.



When the air pressure in the reservoir reaches the specified setting, the diaphragm lifts the piston and contact disc against the spring pressure to separate the contacts.

Switch may be checked for leakage by fully charging air system and smearing switch with soap solution.

Switch may be disassembled by removing cover nuts.



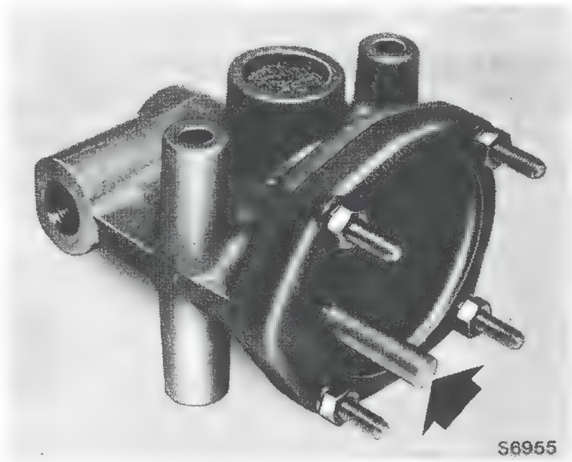
Life of contacts may be extended by turning contact disc and contact plate over, thereby bringing fresh contact surfaces into operation.

During reassembly ensure shims are correctly located between spring and upper terminal as these control the pressure at which switch operates.

92 SPRING BRAKE INTERLOCK VALVE

On models built to Code 754 a spring brake interlock valve is incorporated in the supply air line to the parking brake control valve.

The valve is secured to the cab back panel with the operating button (arrowed) protruding through the panel between the driver's and passenger seat squabs.

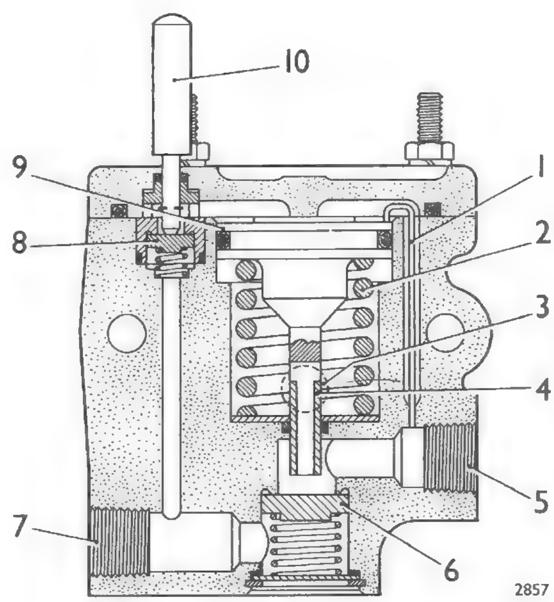


The valve prevents inadvertent release of the spring brake actuator due to the engine being started with the parking brake control valve in the 'RELEASE' or 'OFF' position.

Should the pressure in the delivery port (5) drop below 2.8–3.4 bar (40–50 lb/sq in.), the pressure above the piston (9) will also drop due to air bleed past choke (1), allowing the piston to rise under the action of the spring (2). As the piston rises, supply valve (6) closes and prevents the entry of air from supply port (7).

The remaining pressure on the delivery side of the valve is exhausted to atmosphere via the exhaust stem (4) and exhaust port (3) when the piston moves further up the bore.

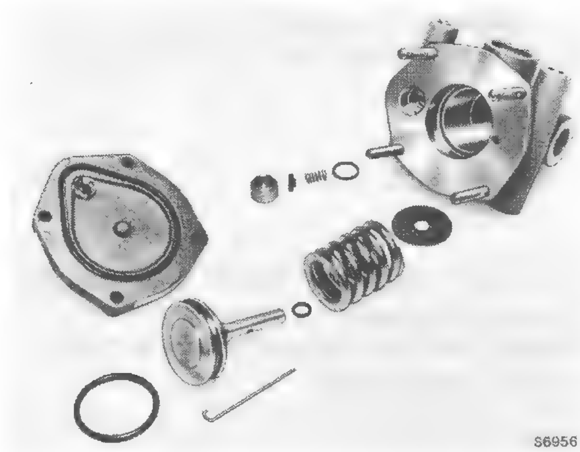
To reinstate the supply pressure to the parking brake control valve, button (10) must be depressed to open control valve (8) and allow air pressure to operate on piston (9). This will open supply valve (6) and allow air through to delivery port (5).



The choke (1) is installed to limit the rate of pressure fluctuation over the piston and consists of a thin rod located in a hole in the valve body.

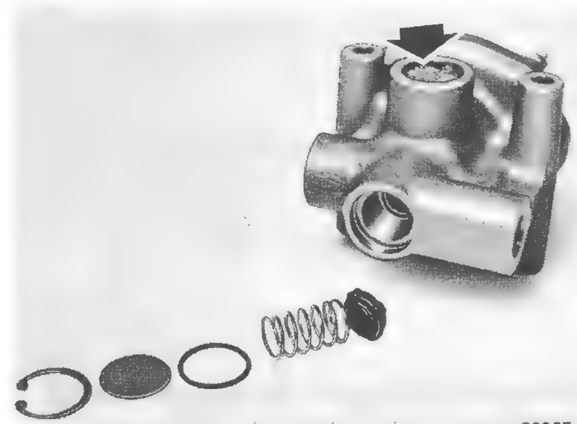
92a SPRING BRAKE INTERLOCK VALVE – Disassembly

Piston assembly, spring and control valve assembly may be withdrawn after removal of top cover and choke rod. Choke rod is a push fit in body.



S6956

Supply valve assembly may be withdrawn after removal of circlip. Exhaust port strainer (arrowed) is removed in a similar manner.



S6957

92b SPRING BRAKE INTERLOCK VALVE – Inspection

Discard all components which will be renewed from a repair kit.

Ensure sliding surfaces of valve body and piston are free from scores.

Check that air passages are not obstructed.

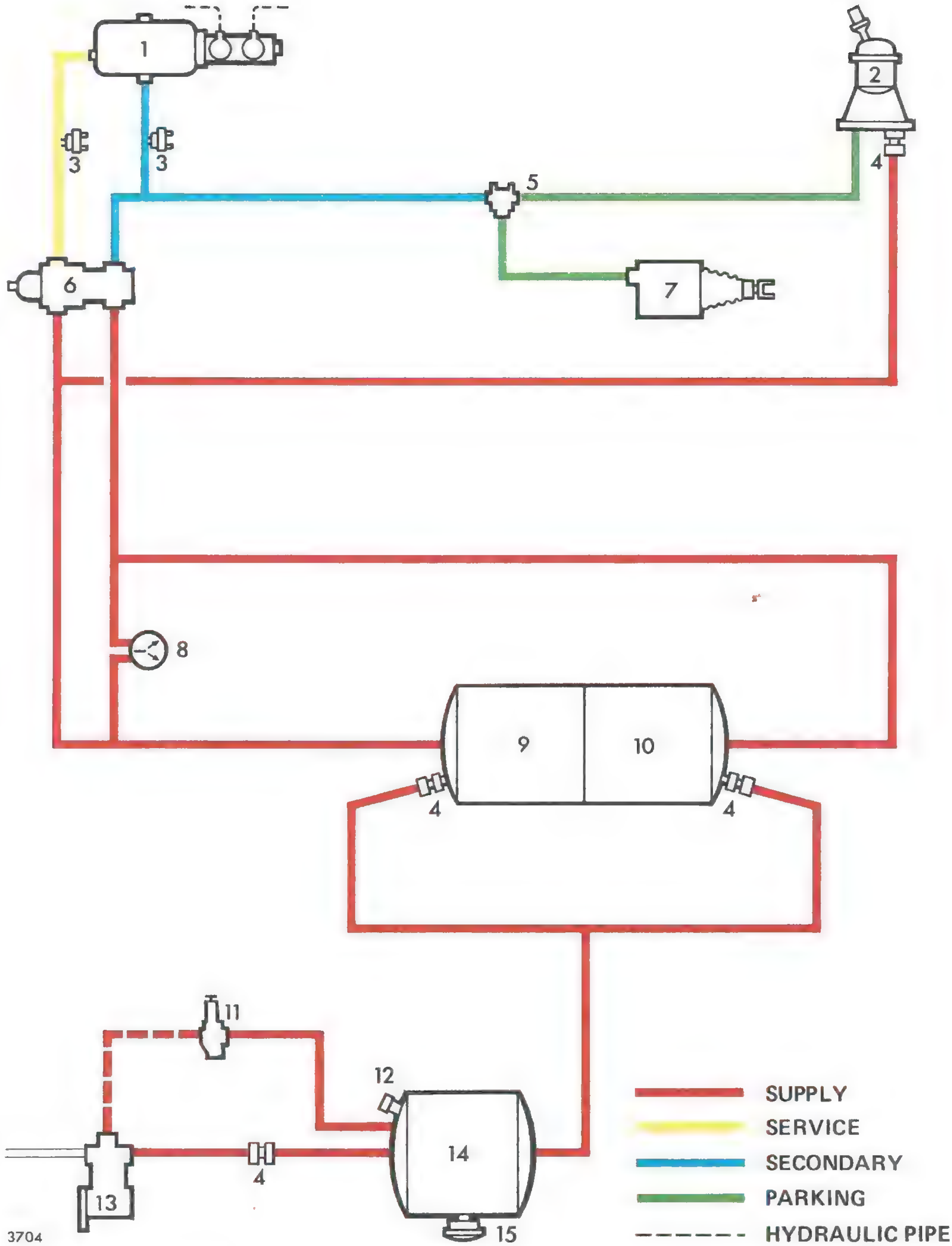
92c SPRING BRAKE INTERLOCK VALVE – Reassembly and Installation

Before reassembly smear all sliding surfaces, including seals, with grease.

Valve control pressure is determined by spring rating and no adjustment is necessary.

After installation smear valve body with soap solution to check for air leakage.

AIR PRESSURE OPERATED HYDRAULIC SYSTEM WITH SPRING BRAKE ACTUATOR



1. Master cylinder actuator
2. Parking brake control valve
3. Stop lamp switch
4. Non-return valve
5. Change-over valve
6. Footbrake valve
7. Spring brake actuator
8. Dual air pressure gauge
9. Primary reservoir
10. Secondary reservoir
11. Compressor governor valve
12. Safety valve
13. Compressor
14. Condensing reservoir
15. Automatic drain valve

Schematic diagram of braking system

The air/hydraulic braking system operated by the footbrake pedal applies the brakes by means of an actuator and hydraulic tandem master cylinder. The actuator has a service and secondary means of air supply which are independent of each other and controlled by a footbrake valve. In the event of failure of the service system the secondary system remains operational to provide reduced but positive braking.

A parking brake control valve operates the brakes on the rear wheels by means of a spring brake actuator and mechanical linkage (Model EOR), or two spring brake actuators and a quick release valve (Models ERT and YRQ).

When the parking brake is applied air is exhausted from the spring brake actuators and the brakes are held on by spring pressure. Provision is made in the condensing reservoir for the attachment of an independent air supply should it become necessary to move the vehicle while the engine is inoperative.

A dual air pressure gauge in the instrument panel indicates the service and secondary reservoir pressures.

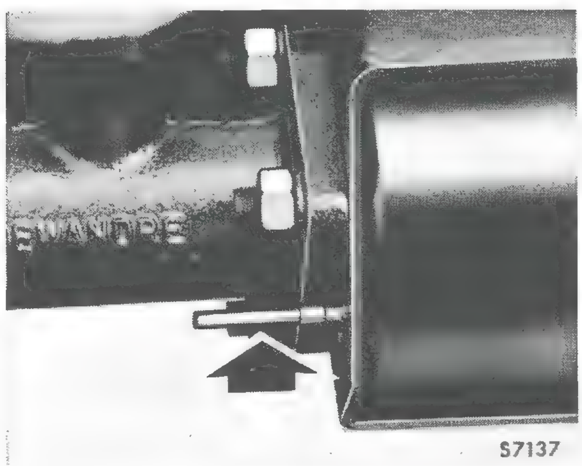
The hydraulic brakes on Model EOR are of the leading/trailing shoe type operated by double-acting brake cylinders.

The hydraulic brakes on Models ERT and YRQ are of Lockheed two-leading-shoe type.

To prevent air operated auxiliaries affecting the performance of the brake system on coaches, a pressure loss limiting valve must be installed in the auxiliary equipment supply air line. Information concerning a pressure loss limiting valve is included in Section G.

93 BRAKE ADJUSTMENT

As the master cylinder actuator is operated by air pressure from the footbrake valve, brake shoe travel is not reflected in brake pedal movement. To provide an indication of brake shoe travel on Models EOR and ERT, an indicator rod is incorporated in the master cylinder actuator. The rod moves out of the actuator to the same extent as the push rod moves to operate the master cylinder, and when the groove on the indicator rod is fully exposed the brake shoes require adjustment.



S7137

On Model YRQ a micro switch is incorporated in the actuator to illuminate a warning lamp in the instrument panel when the brakes require adjustment. Before adjusting the brakes, check the hub bearings for slackness. If necessary, adjust the bearings.

Check also for excessive wear of the shoe facings. These can be examined through the inspection holes in each flange plate.

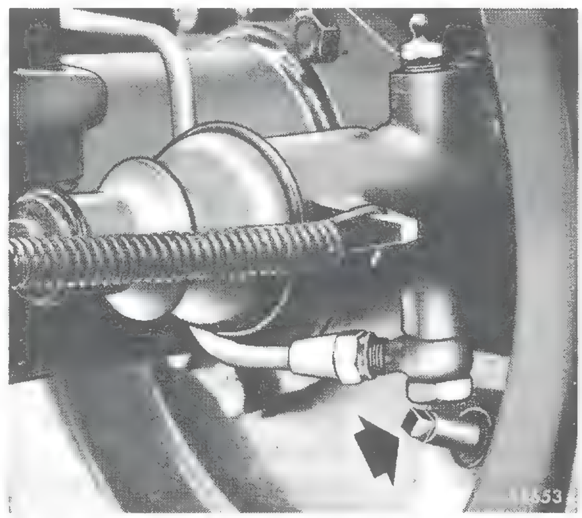
After adjusting brakes, re-set indicator rod by pushing it into actuator until it contacts piston.

There are two adjusters on each front brake and one adjuster on each rear brake.

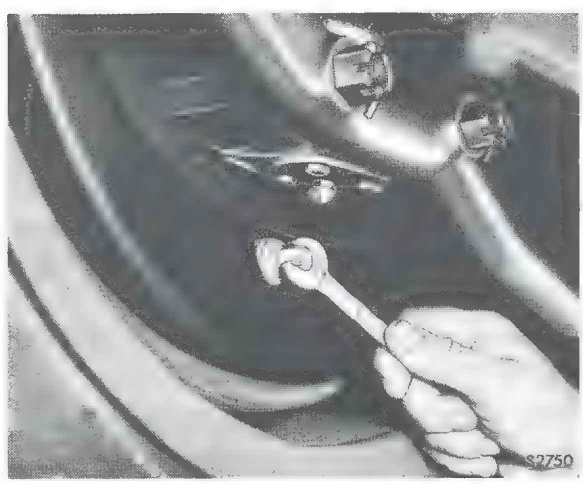
To adjust leading/trailing shoe front brakes, fully charge air system, turn adjusters anti-clockwise until drum is free to rotate then turn front adjustor clockwise until shoe is hard against drum. Centralize shoe by applying heavy pressure to brake pedal then back off adjuster until shoe is just clear of drum. Repeat operation with rear adjuster.

Before adjusting rear brakes, fully charge air system and release parking brake.

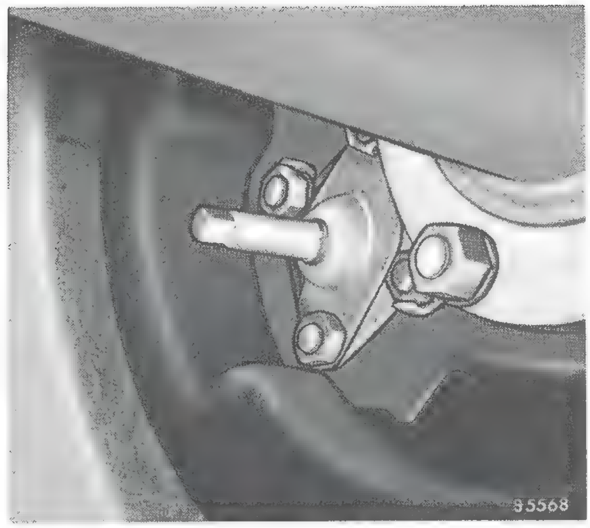
Turn adjuster on each brake clockwise until shoes are hard against drum. Centralize shoes by applying heavy pressure to brake pedal then back off adjuster until shoes are just clear of drum.



To adjust two-leading-shoe front brakes, fully charge air system and turn adjusters clockwise on left-hand brake and anti-clockwise on right-hand brake, until each shoe is hard against drum. Centralize shoes by applying heavy pressure to brake pedal, three times in quick succession, and again adjust shoes into contact with drum. Repeat this operation until no further adjustment can be made, re-charging air systems as necessary, then back off adjusters until shoes are just clear of drum.



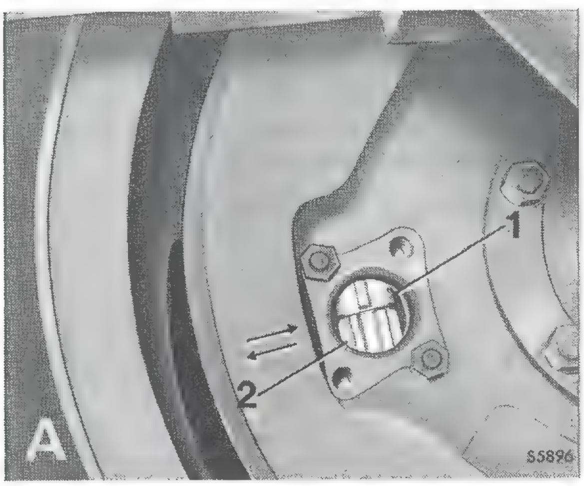
Rear brake adjustment is the same as for front brakes except that adjuster on each brake should be turned clockwise to bring shoes into contact with drum.

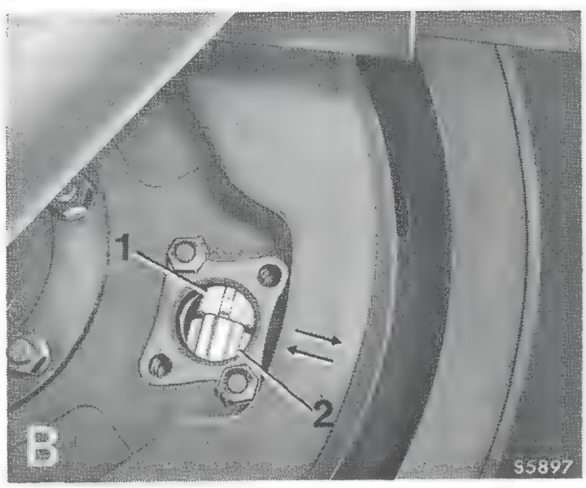


The parking brake is adjusted automatically with the footbrake adjustment and no other adjustment is required except after parts of the parking brake linkage have been disturbed.

93a TWO-LEADING-SHOE REAR BRAKES – Adjustment After Reconditioning

If for any reason the rear brakes have been disassembled, or the brake shoes disturbed, it is essential that the brake shoes are centralized.



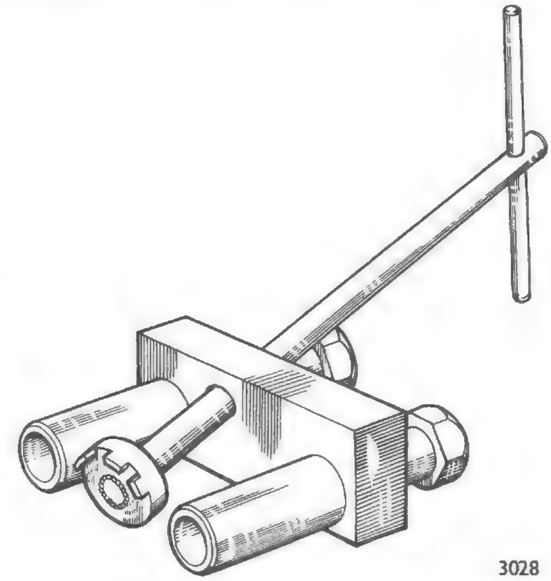


To centralize shoes, fully charge air system and withdraw adjuster pinion assembly by removing the two nuts without locking tabs. Rotate secondary shoe adjuster sleeve (1) to off position. Left-hand brake adjuster is shown at 'A' and right-hand adjuster at 'B'.

While turning brake drum in forward direction, rotate primary shoe adjuster sleeve (2) in direction of arrow until primary shoe just prevents drum from rotating. After centralizing primary shoe by applying heavy pressure to brake pedal, three times in quick succession, repeat adjustment and centralizing operation until no further adjustment can be made.

Rotate secondary shoe adjuster sleeve in direction of arrow until shoe is hard against drum and repeat centralizing and adjustment operation with secondary shoe adjuster sleeve.

Use Adjuster VR2116 to rotate adjuster sleeves.



3028

Install adjuster pinion assembly ensuring that pinion teeth engage splined adjuster sleeves. Slight adjustment of sleeves may be required. Back off adjuster anti-clockwise until drum is free to rotate.

94 BLEEDING THE HYDRAULIC SYSTEM

Before bleeding system, fully charge air system, adjust brakes, and release parking brake.

Bleed each brake in turn in sequence left-hand rear, right-hand rear, left-hand front, right-hand front. It is not necessary to fully depress brake pedal during this operation. To ensure master cylinder pistons fully return after each stroke of brake pedal, exhaust diaphragm should be removed from rear of footbrake valve during bleeding operation.

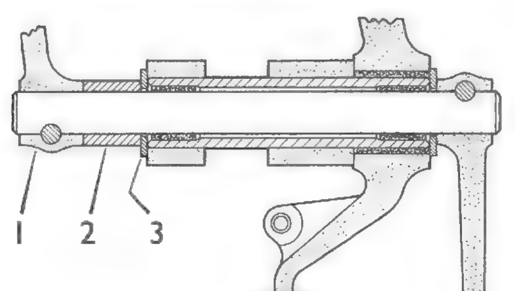
After bleeding system, push indicator rod into master cylinder actuator until it contacts piston and apply heavy pressure to brake pedal. Check that indicator rod does not emerge sufficiently to reveal its groove or, on Model YRQ, that warning lamp does not illuminate as this indicates presence of air, leakage in hydraulic system or incorrect brake shoe adjustment.

It is important that exhaust diaphragm is correctly replaced after bleeding operation is complete.

95 BRAKE PEDAL AND LINKAGE

The brake pedal and linkage is similar to that described in Section 20 except that the relay lever pivots on a non-metallic bush and is connected, by a push rod, to the footbrake valve.

On left drive models with power-assisted steering a spacer (2) is installed between washer (3) and clutch pedal (1).

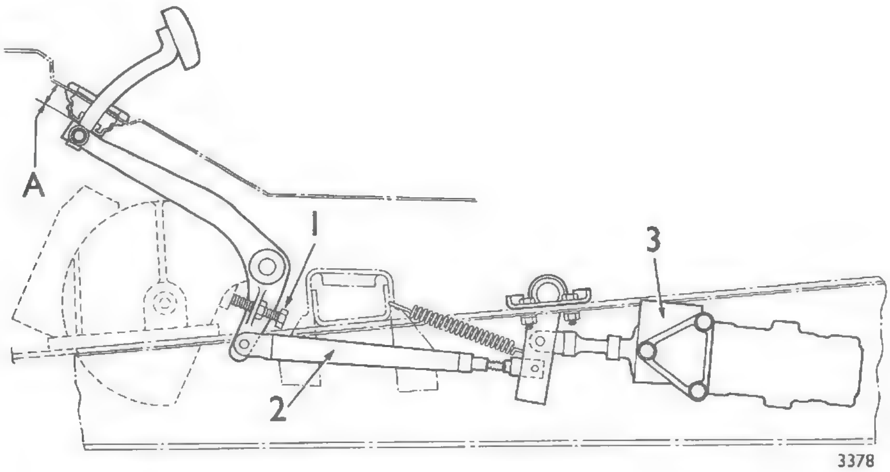


2296

On right drive vehicles with power-assisted steering the pedal side clearance is not adjustable.

95a BRAKE PEDAL SETTING

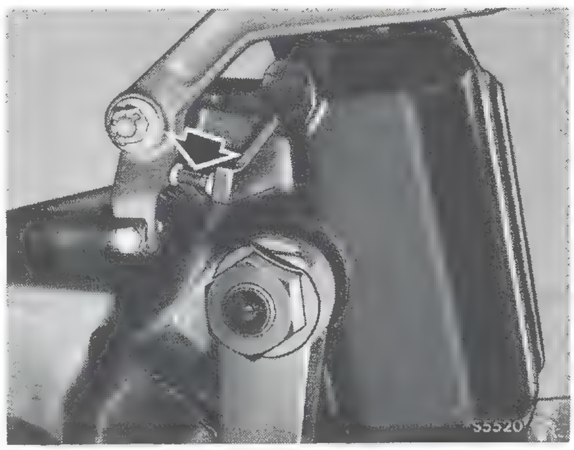
It is not usually necessary to alter the brake pedal setting unless the stop bolt has been disturbed or parts of the linkage renewed.



Pedal may be re-set by adjusting pedal stop bolt (1) until dimension 'A' between pedal lever and underside of toe panel is 1.00 in. With pedal held against stop and footbrake valve (3) in off position adjust length of brake pedal push rod (2) until all free play is just eliminated.

On Model YRQ adjust pedal stop bolt (arrowed) until distance between pedal lever and underside of toe panel is 3.70 in. before adjusting length of pedal push rod.

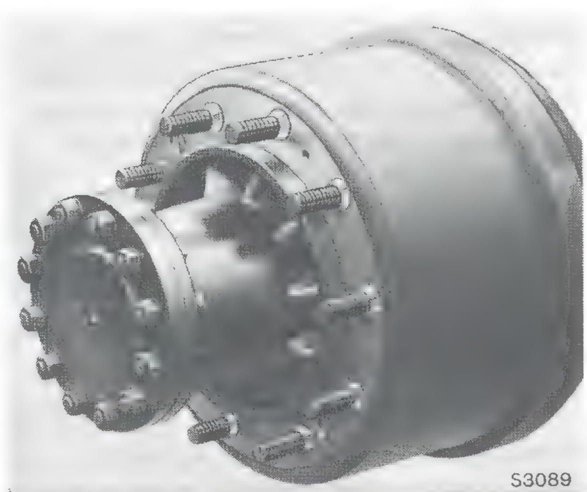
After installing push rod clevis pin, back off pedal stop bolt half a turn to provide pedal free travel.



96 BRAKE DRUMS

The brake drums on Models EOR and YRQ are similar to those used with suspended-vacuum servo-assisted brakes and the information contained in Section 34 may be applied.

The brake drums on Model ERT locate on the wheel bolts and are attached to the outside of the hubs by countersunk screws. Loose split cones on the wheel bolts locate the wheels.

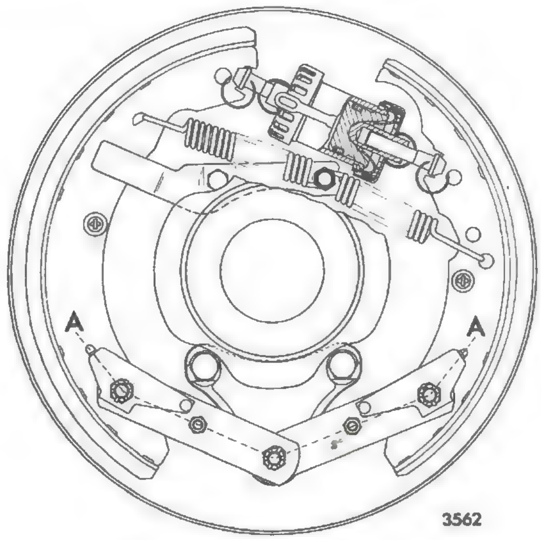


Hubs and drums should be removed and installed as assemblies as described in Training Manuals TS1085 and TS1086.

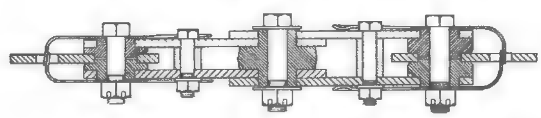
When assembling a new drum to hub, ensure mating surfaces are clean and free from damage.

97 FRONT BRAKE SHOES

The front brakes on Model EOR are similar to those described in Section 5 except that each shoe is provided with a drum-type adjuster and individual pull-off spring. The leading shoe is provided with a support attached to the flange plate.



3562



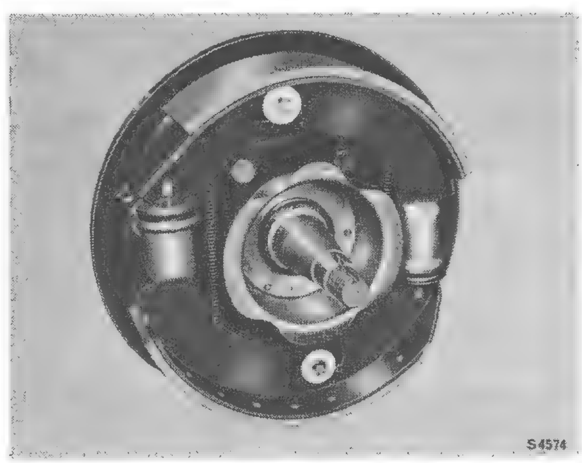
SECTION A-A

3712

When refacing shoes install shorter rivets in eight holes nearest centre of shoe.

When assembling pull-off springs attach squared end to brake shoe and ensure spring with greater number of coils is attached to leading shoe.

On Models ERT and YRQ, the front brakes are of the two-leading-shoe type with fabricated shoes and facings secured by rivets. The shoes are held in contact with the brake cylinder pistons by small tension springs, and two pull-off springs are attached to the shoe webs. Cam-type adjusters, one for each shoe, are located in the flange plate and also act as shoe supports.



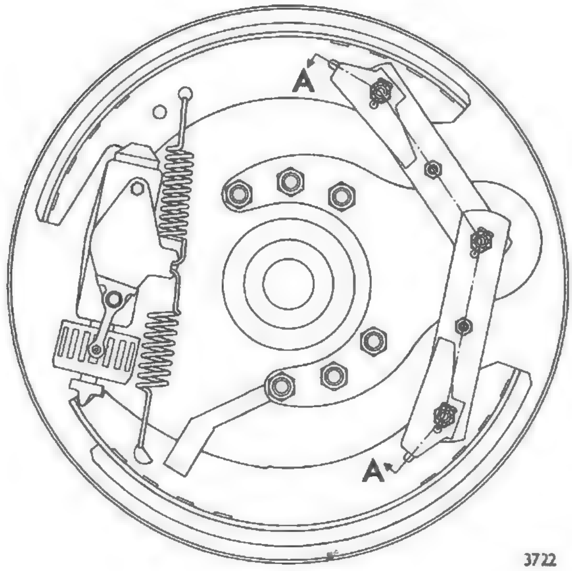
S4574

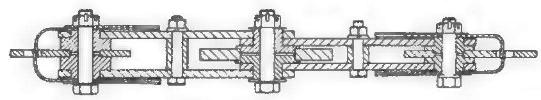
Shoes may be removed after disconnecting brake shoe tip springs and removing circlip and washers from each adjuster.

When removing brake shoes secure brake cylinder pistons with wire to prevent displacement.

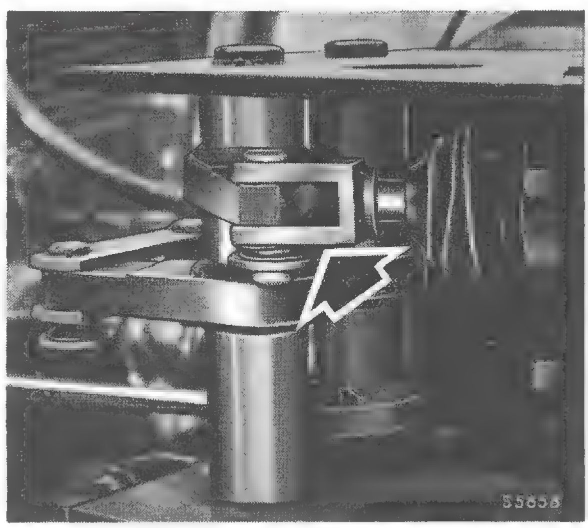
When installing shoes, end of shoe with greater length of exposed flange should be adjacent to brake cylinder piston. Pull-off springs should be on outside of shoes.

The rear brakes of Model EOR are similar to those described in Section 6 except that drum-type shoe adjusters actuated by a sprocket attached to a square-headed spindle are used. The leading shoe is provided with a support retained by the anchor plate bolts.




SECTION A-A

Before removing hub and drum assembly, fully charge air system, release parking brake, and disconnect spring brake actuator clevis from relay lever.

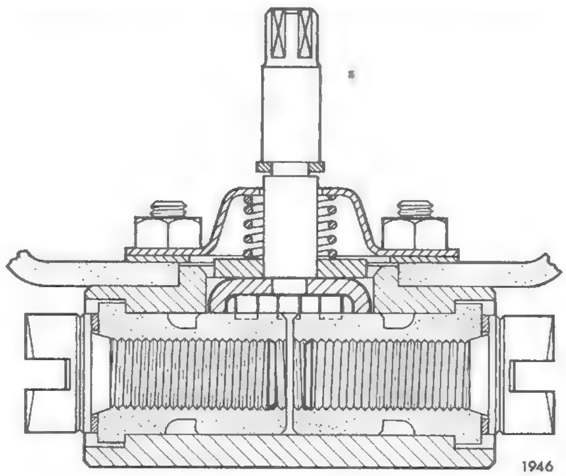


When refacing shoes, install shorter rivets in eight holes nearest centre of shoe.

When assembling pull-off springs attach squared end to brake shoe and ensure spring with larger coils is attached to leading shoe.

On Models ERT and YRQ the rear brakes are of the two-leading-shoe type with fabricated shoes and facings secured by rivets. The upper shoe (YRQ) or lower shoe (ERT), is located in a flanged carrier which enables the shoe to operate as a leading shoe. Two pull-off springs hold the shoes and carrier in contact with the adjuster and the expander, and each shoe is provided with a steady bolt which passes through a loose fitting collar in the shoe web, through an adjustable spacer, and is secured to the flange plate by a nut.

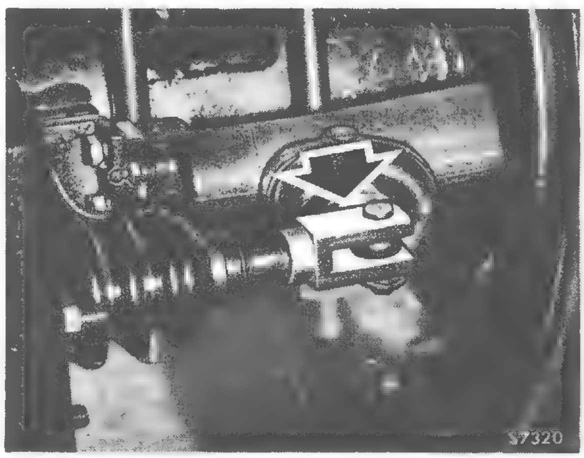
The rear brake shoe adjuster comprises an adjuster assembly and an adjuster pinion assembly. The adjuster assembly consists of a housing incorporating two left-hand threaded sleeves which accommodate the adjuster screws. The exterior of each sleeve is splined. The pinion assembly has a toothed sprocket which engages the splines of both adjuster sleeves.



Rotation of the pinion rotates the sleeves. As the adjuster screws are prevented from rotating by the brake shoe webs, they move in or out of the sleeves, depending on the direction the pinion is rotated. The sleeves are shouldered to prevent their axial movement through the housing.

Removal of the adjuster pinion assembly exposes the two adjuster sleeves. The sleeves may be rotated separately to enable each shoe to be adjusted individually for centralization purposes.

Before removing hub and drum, fully charge air system, release parking brake and disconnect actuator clevis from brake cylinder.



Shoes and carrier may be withdrawn after removing nuts securing steady bolts from back of flange plate.

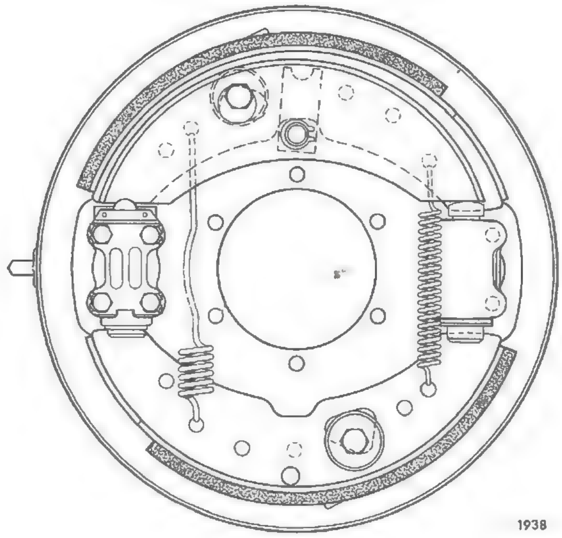
Carrier may be separated from shoe after unscrewing steady bolt.

If necessary, rocker link may be removed by detaching circlip and withdrawing pin.

Before assembling shoe to carrier, smear shoe roller with recommended grease and insert it into central hole in one of the brake shoes. Locate shoe within carrier so that loose fitting collar lines up with holes in carrier, and roller engages cut-out in carrier link.

Insert steady bolt through collar in shoe web, and assemble spacer with hexagon end away from shoe web.

Before installation arrange shoes so that toe of one shoe i.e. end with greater length of exposed shoe flange, faces heel of other shoe, and hook pull-off springs to outside of shoe webs so that longer hooked end of each spring is attached to carrier shoe.



1938

Assemble shoes to flange plate with springs on the outside and with carrier shoe to abutment plate end of expander. Engage tips of shoes with appropriate expander tappets and adjuster screws.

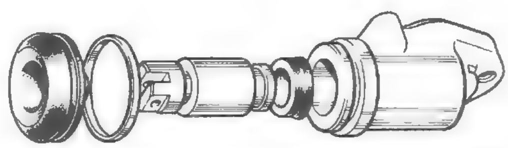
After installing shoes, assemble steady bolts through flange plate and adjust spacers until shoe facings are at right-angles to flange plate. Tighten nuts to specified torque.

Adjust brakes as described in Section 93a.

99 FRONT BRAKE CYLINDERS

The front brake cylinders on Model EOR are similar to those used with suspended-vacuum servo-assisted brakes and the information contained in Section 37 may be applied.

The front brake cylinders on Models ERT and YRQ are bolted to the inside of the flange plates and contain a piston and seal protected by a dust cover attached to the open end of the cylinder.



3529

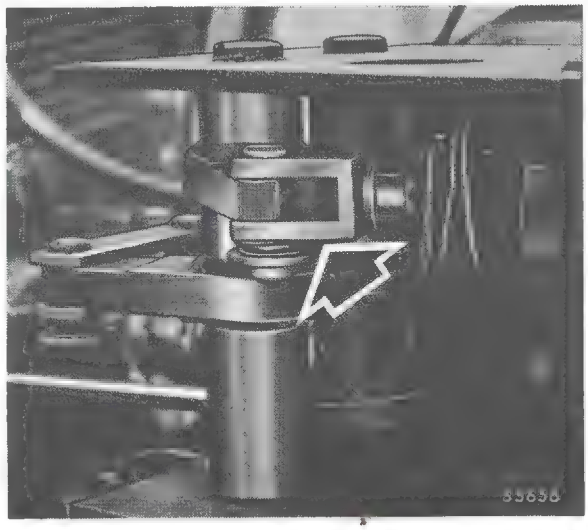
Seal lip faces towards inner end of piston.

Before assembling cylinder, smear piston and cylinder bore with recommended brake fluid.

100 REAR BRAKE CYLINDERS

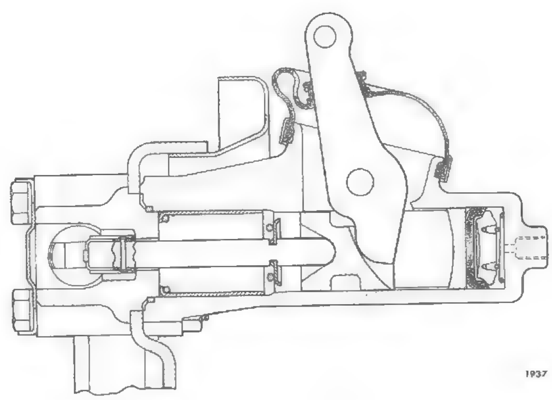
The rear brake cylinders on Model EOR are similar to those used with direct-vacuum servo-assisted brakes and the information contained in Section 8 may be applied.

Before removing rods from bell crank lever fully charge air system and, with parking brake released, disconnect spring brake actuator clevis from relay lever.



After installing cylinder, adjust length of rods as described in Section 86a.

On Models ERT and YRQ each rear brake cylinder is attached to the outside of the flange plate and operates an expander on the inside of the plate. The parking brake operating lever pivots on a pin in the cylinder housing and engages the piston.



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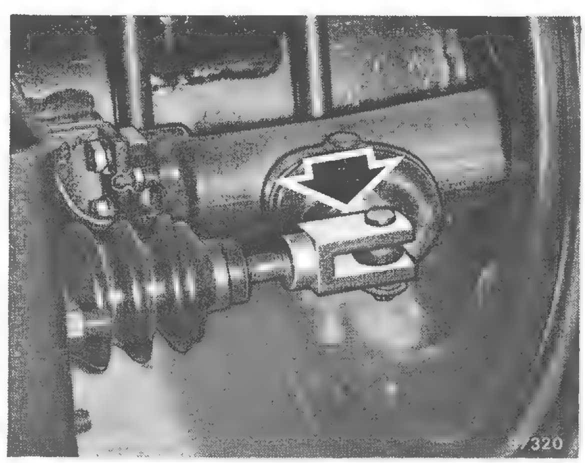
Before removing hub and drum for access to heads of brake cylinder retaining bolts, fully charge air system, release parking brake and disconnect actuator clevis from brake cylinder.

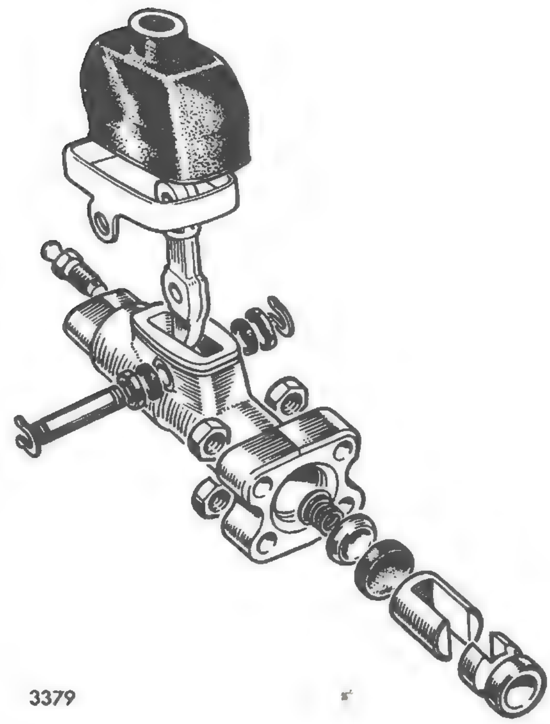


Parking brake operating lever, gaiter and retainer may be withdrawn after removing circlips and drifting pin out of body.

Pistons, seal, filler and spring may be ejected from cylinder by applying low air pressure to fluid connection.

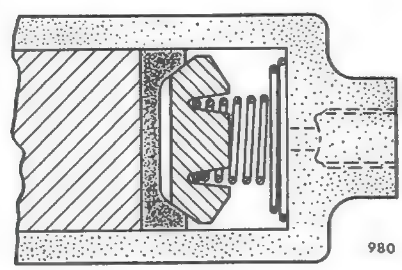
Examine piston and bore for wear and scores. Seal should be renewed whenever cylinder is disassembled.

Before reassembly, smear pistons, seal, filler and cylinder bore with recommended lubricant.



3379

Before installing seal and filler ensure spring locates in groove in filler and recessed side of seal locates over filler.



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When installing seal, filler and spring, hold cylinder vertically with open end of bore facing downwards.

Before installing parking brake operating lever, insert longer piston with slotted end towards open end of cylinder and with slot aligned with lever aperture.

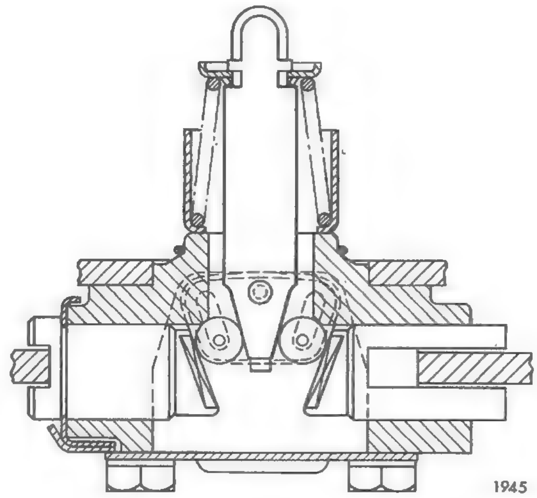
Smear lever pin with recommended grease before installation.

Insert remaining piston with slot aligned with parking brake operating lever.

101 REAR BRAKE BISECTORS — Model EOR

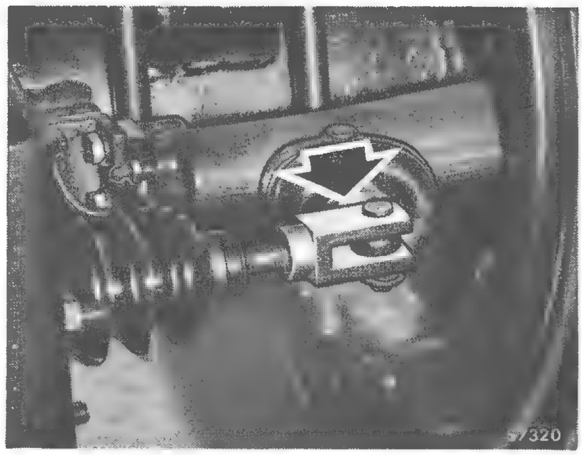
The rear brake bisectors on Model EOR are similar to those used with direct-vacuum servo-assisted brakes and the information contained in Section 9 may be applied except for the brake cylinder removal and installation procedure described in Section 100.

102 REAR BRAKE EXPANDERS — Models ERT and YRQ



1945

The expander unit on Models ERT and YRQ consists of a body which houses two tappets. The inner ends of the tappets have inclined faces on which rollers attached to the expander push rod operate. The push rod return spring is located inside a sleeve which protrudes into the bore of the brake cylinder to act as a piston stop.



57320

Before removing hub and drum, fully charge air system, release parking brake, and disconnect spring brake actuator clevis from brake cylinder.

Bolts securing expander also support brake cylinder.

Spring and sleeve may be withdrawn after removing spring retainer.

Before reassembly, smear tappets and rollers with recommended lubricant.

Install spring retainer with convex side to spring and ensure tabs firmly engage in push rod groove.

When installing tappets, insert tappet with dust cover in bore of body opposite abutment plate end, and ensure sloping ends of tappets are in correct relationship to push rod.

Before installing expander, locate seal on boss on rear of expander.

Adjust brakes as described in Section 93a.

103 MASTER CYLINDER

The master cylinder is as described in Section 56, except that on Models ERT and YRQ the check valves do not incorporate a by-pass hole.

Refer to Section 113d for installation procedure.

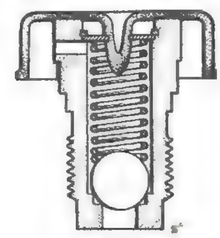
When connecting hydraulic pipes on Model YRQ, note that forward half of master cylinder supplies rear brakes.

104 NON-RETURN VALVES

Non-return valves, identical to those described in Section 75, are incorporated in the service and secondary reservoir supply connections and in the parking brake control valve supply line. In addition, a line non-return valve is included in the air line between the compressor and the condensing reservoir. When installing valve, arrow on body must be in direction of condensing reservoir.

105 SAFETY VALVE

A safety valve, located in the condensing reservoir, protects the air system against excessive air pressure in the event of governor valve failure. The valve is non-adjustable and consists of a body containing a spring-loaded ball check-valve retained by a washer and circlip. A dust cover is fitted over the valve body.



3530

105a SAFETY VALVE — Operating Test

Operation of safety valve may be checked by disconnecting air line to governor valve at condensing reservoir and installing a plug in reservoir connection. Charge system and note pressure, registered on vehicle gauge, at which safety valve operates.

If valve fails to release air at specified pressure remove and clean valve. If valve still fails to operate it must be renewed.

105b SAFETY VALVE — Leakage Test

Safety valve may be checked for leakage by fully charging system and smearing valve with soap solution. If leakage exceeds a one inch soap bubble in five seconds renew valve.

106 STOP LAMP SWITCHES

A stop lamp switch is incorporated in the air line between the footbrake valve and the master cylinder actuator, and the air line to the change-over valve. The switches are located on the inside of the chassis sidemember and consist of a body and cover containing two terminals, an electrical contact strip, piston, diaphragm and piston return spring.

106a STOP LAMP SWITCHES — Leakage Test

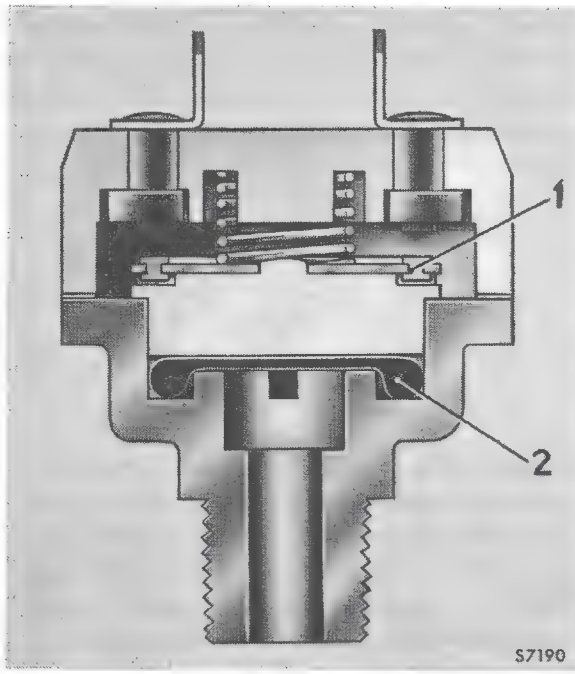
Stop lamp switches may be checked for leakage by fully charging air system and smearing switch with soap solution. With footbrake applied, leakage at cover indicates a faulty diaphragm.

Switch is disassembled by removing cover screws.

If switch contacts are only slightly pitted they may be cleaned with a fine cut file. If contacts are badly burnt or pitted, switch cover should be renewed together with contact strip (1).

Lightly smear diaphragm bore with recommended grease before installing diaphragm (2) with plain side towards switch cover.

When installing contact strip, ensure larger diameter contact heads are towards switch cover.



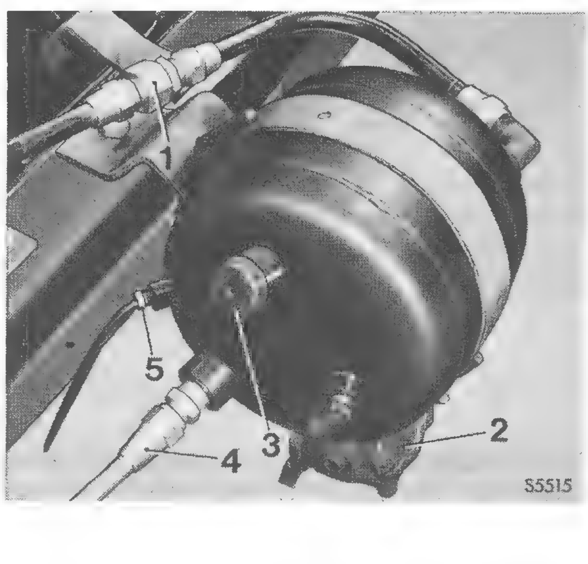
107 LOW AIR PRESSURE WARNING SWITCHES

Information concerning the low air pressure warning switches on Model YRQ is contained in Section 233.

108 CONDENSING RESERVOIR

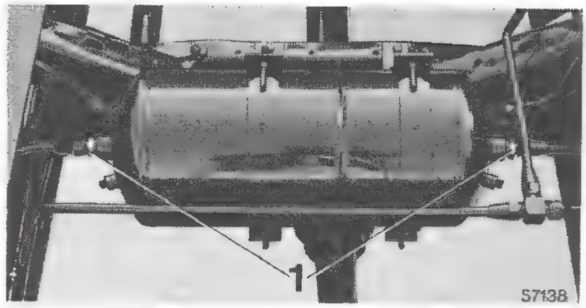
A condensing reservoir, fed by air from the compressor via a non-return valve (1), is mounted on the chassis sidemember at the front of the vehicle on Models EOR and ERT, and on the chassis crossmember adjacent to the dual air reservoir on Model YRQ.

The reservoir is fitted with an automatic water drain valve (2) and a non-adjustable ball-type safety valve (3). Air lines (4 and 5) supply the dual air reservoir and compressor governor valve respectively.



109 DUAL AIR RESERVOIR

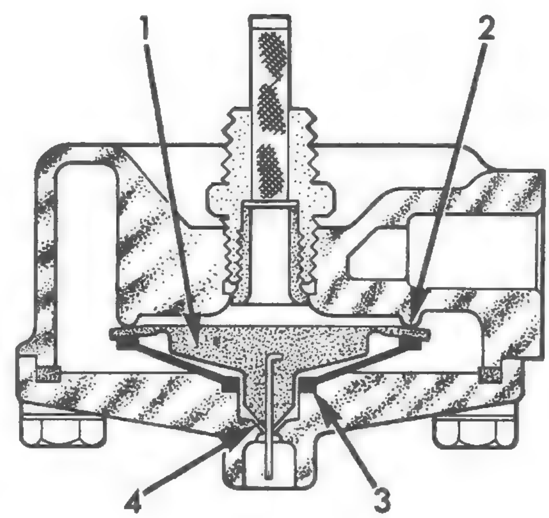
A dual reservoir comprising a service air reservoir and a secondary air reservoir combined in one assembly is mounted on the chassis crossmember. The reservoirs, which are fed with dry air from the condensing reservoir via non-return valves (1), supply air to the footbrake valve and the secondary reservoir also supplies the parking brake control valve. The reservoirs are provided with drain plugs.



On Model YRQ the reservoirs incorporate low pressure warning switches which actuate a buzzer and a warning lamp inside the vehicle if the air pressure in either reservoir falls below the minimum required. The service reservoir also incorporates a feed to the parking brake control valve.

110 AUTOMATIC DRAIN VALVE

The automatic drain valve, located in the lowest part of the condensing reservoir, comprises a body and cover containing an inlet/exhaust valve (1) and a nylon valve guide (3).



1431

The inlet and exhaust valves are normally in contact with their seats (2 and 4) but air and condensate from the reservoir pass into the valve body by flexing the inlet valve away from the seat. The air pressure inside the valve is, therefore, the same as the reservoir pressure.

When the reservoir pressure is reduced, the air pressure in the valve body causes the inlet/exhaust valve to lift and open the exhaust valve, allowing condensate and air to exhaust through the cover.

After this operation is complete, reservoir pressure above inlet/exhaust valve is greater than pressure below the valve, and exhaust valve again closes.

110a AUTOMATIC DRAIN VALVE – Operating Test

With air system fully charged, decrease pressure by applying and releasing brakes and check that drain valve exhausts air and/or condensate. If valve fails to operate, carefully depress wire in exhaust port. If air is not exhausted remove valve for cleaning.

110b AUTOMATIC DRAIN VALVE – Air Leakage Test

With air system fully charged, smear valve body and cover with soap solution and check for leakage.

Leakage from exhaust port indicates a faulty exhaust valve and/or seat. Leakage from body indicates a faulty sealing ring.

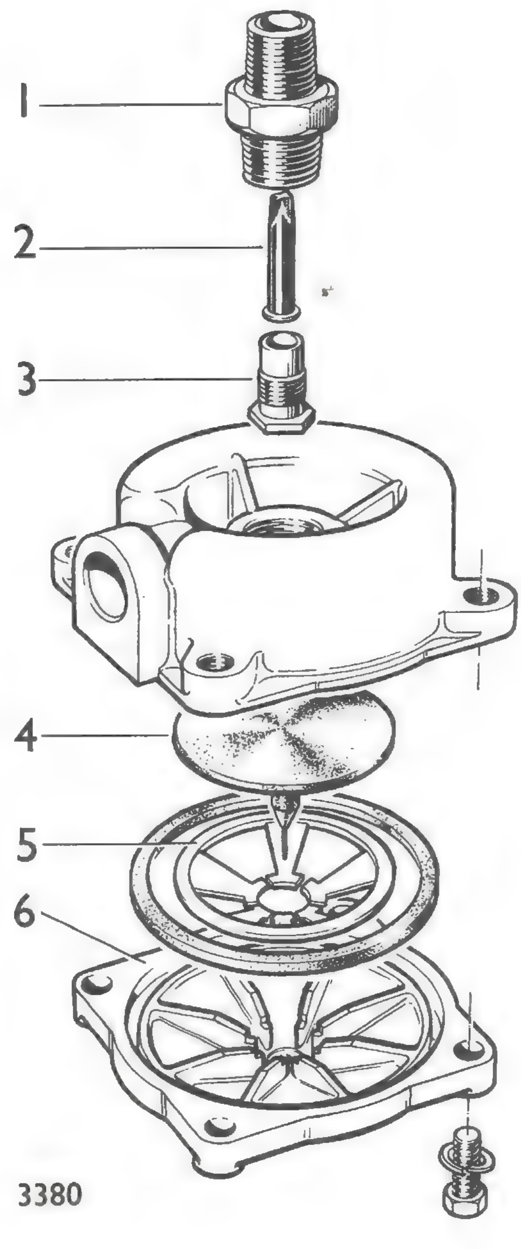
Note that slight leakage at exhaust port may be caused by excessive leakage in other parts of air brake system.

Before removing valve, release pressure from system.

Filter (2) may be withdrawn after removing adaptor (1) and unscrewing filter retaining sleeve (3).

Valve guide (5) and inlet/exhaust valve (4) may be withdrawn after removing cover (6).

Wipe inlet/exhaust valve with a clean dry cloth and examine for wear and deterioration.



3380

111 COMPRESSOR GOVERNOR VALVE

The compressor governor valve is similar to that described in Section 60. The cut-out pressure may be checked on the vehicle dual air pressure gauge.

112 COMPRESSOR ANTI-FREEZER

Information concerning the compressor anti-freezer, which may be connected to the compressor intake, is contained in Section 258.

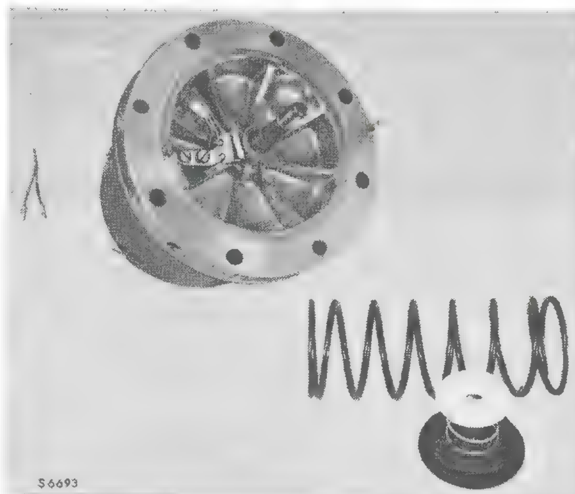
113 MASTER CYLINDER ACTUATOR

When the footbrake is applied, compressed air passes to the master cylinder actuator which is mounted, together with the hydraulic tandem master cylinder, on the chassis sidemember.

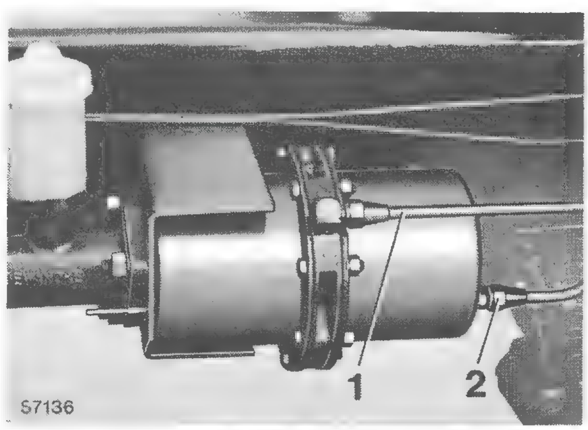
The actuator consists of a circular body clamped between two cylinders, each containing a piston. A push rod, which is held towards the rear of the actuator by a return spring, passes through the centre of one piston and abuts the centre of the other. Movement of either piston is transmitted by the push rod to the master cylinder primary piston. Both cylinders are vented to atmosphere.

An indicator rod which provides visual indication of brake shoe travel is incorporated in the cylinder adjacent to the master cylinder on Models EOR and ERT.

On Model YRQ a micro switch is incorporated in the actuator to indicate the push rod travel. When the push rod has reached its maximum allowable travel a spring-loaded nylon collar on the push rod contacts the switch, which illuminates a red warning light on the instrument panel indicating that the brakes require adjustment.



When the footbrake is applied, compressed air enters the supply ports (1 and 2) of both cylinders behind the pistons. This causes the pistons to move along the cylinders and operate the master cylinder by means of the push rod.



113a MASTER CYLINDER ACTUATOR SWITCH – Operating Test

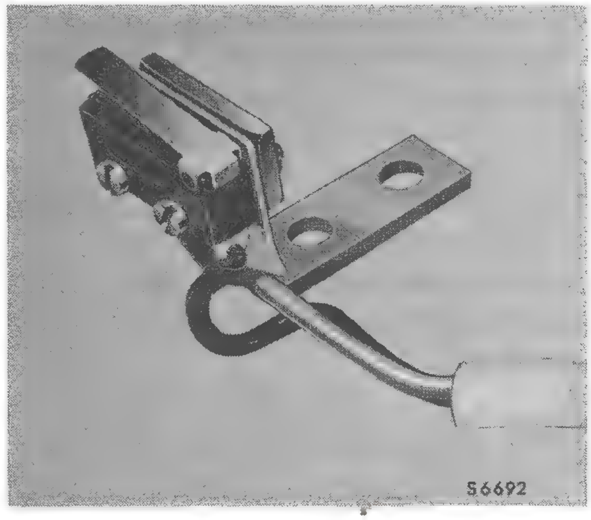
Operation of switch may be checked by fully charging air system and applying footbrake while holding one of the master cylinder recuperating valves in the open position. With key-start switch in running position warning lamp in vehicle should illuminate.

Access to recuperating valve may be gained by removing master cylinder reservoir cap and filter. Fluid level in reservoir should be reduced before carrying out test to prevent spillage.

When removing actuator, note number of shims between master cylinder and support as they control clearance between actuator push rod and master cylinder primary piston.

Mark position of cylinders in relation to body before disassembly.

Removal of the switch from the actuator body is possible after the rear cylinder of the actuator has been removed and the return spring removed from the push rod.

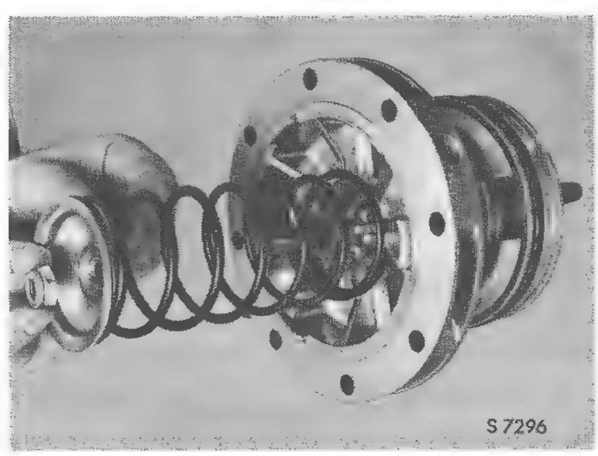

S6692

Piston may be withdrawn from front cylinder by applying low air pressure to supply port.

Indicator rod may be withdrawn from rear cylinder after removing friction disc.


S 7295

Push rod and piston may be separated from body after removing push rod lock nut. Spring tension can be overcome by hand pressure.


S 7296

Felt ring and seal are retained in body by a circlip.

Filter in body should not be removed unnecessarily.

Discard all components which will be renewed from a repair kit.

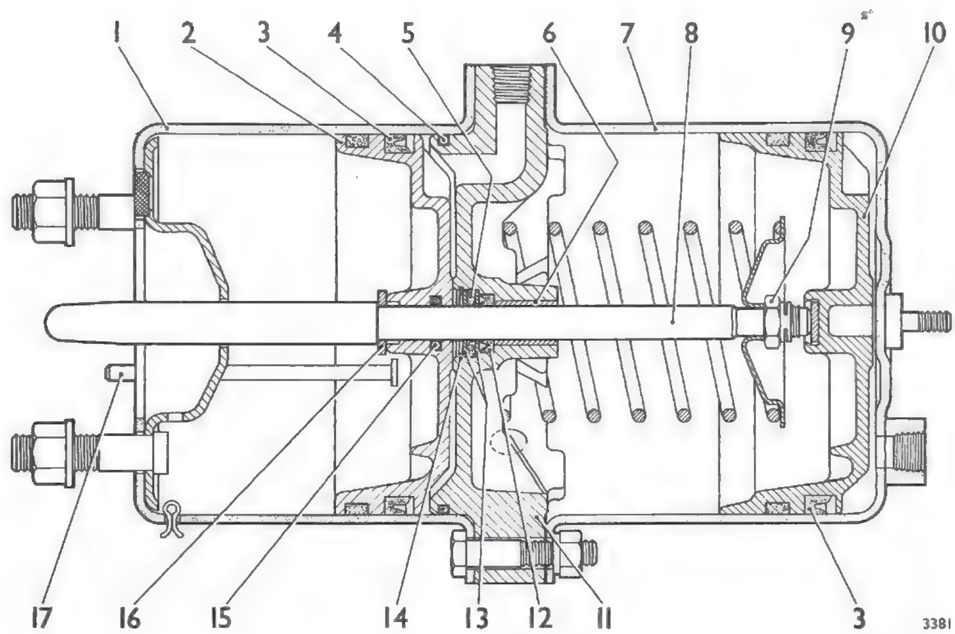
Examine sliding surface of push rod for scores and bush in body for wear. Rod should be a close sliding fit in bush.

Inspect cylinders for dents or signs of scoring and corrosion. Slight corrosion may be removed with fine emery cloth.

113c MASTER CYLINDER ACTUATOR – Reassembly

Before reassembly, liberally smear seals, sealing rings, push rod, bush and sliding surfaces of cylinders, pistons and indicator rod with recommended grease.

Soak felt ring and piston lubricator felts in recommended oil.



Press seal (12) into body (11) with plain side towards bush (6) and insert a washer (13) on each side of felt ring (5) before installing circlip (14).

Assemble seals (3) to groove nearest closed ends of piston (2 and 10) with plain side of seals towards lubricator felt grooves. Locate sealing ring (15) in rear piston push rod bore.

Before assembling piston and body to push rod (8), place thrust washer (16) against abutment on rod. Care should be taken to avoid damaging seal in body, and sealing ring groove (4) on outside of body should be adjacent to piston. Fully tighten push rod lock nut (9).

Insert front piston, closed end first, into cylinder (7) incorporating air supply port.

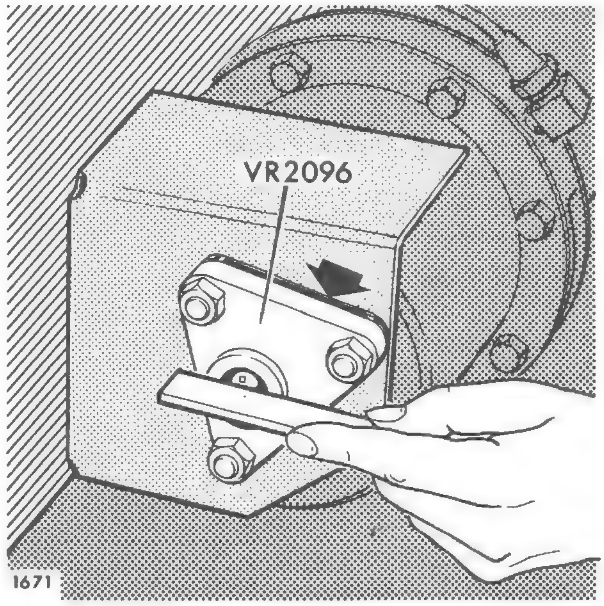
Before installing rear cylinder (1), retain indicator rod (17) with friction disc.

Tighten cylinder retaining bolts to specified torque.

113d MASTER CYLINDER ACTUATOR — Installation

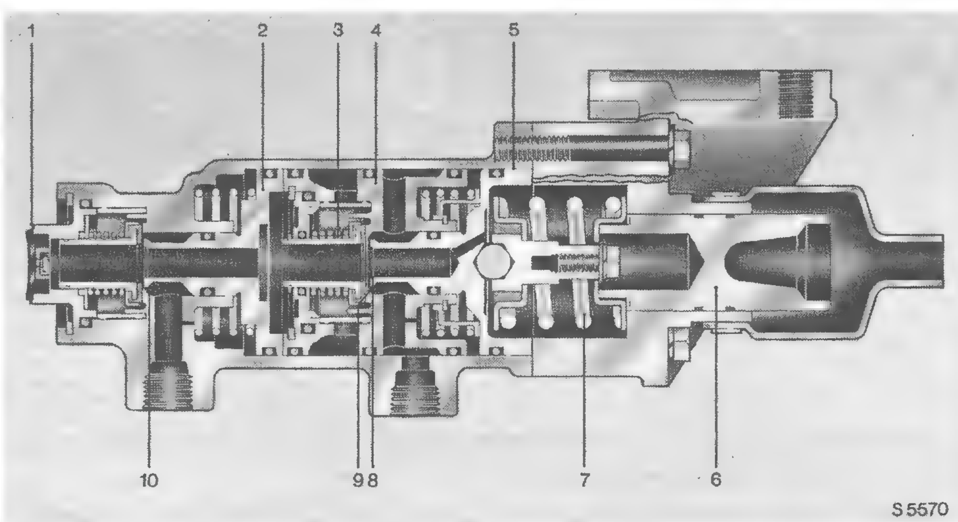
Before installing actuator, determine thickness of shims required between master cylinder and support to provide correct clearance between actuator push rod and master cylinder primary piston.

To determine thickness of shims, locate actuator in support and assemble shims removed and Gauge VR2096. Add or remove sufficient shims until push rod is flush with, or not more than 0.005 in. below gauge. As a final check, shims should be compressed by securing gauge with three nuts.



114 FOOTBRAKE VALVE

The dual footbrake valve, which is operated by the brake pedal, is mounted on the chassis side-member at the front of the vehicle on the driver's side.



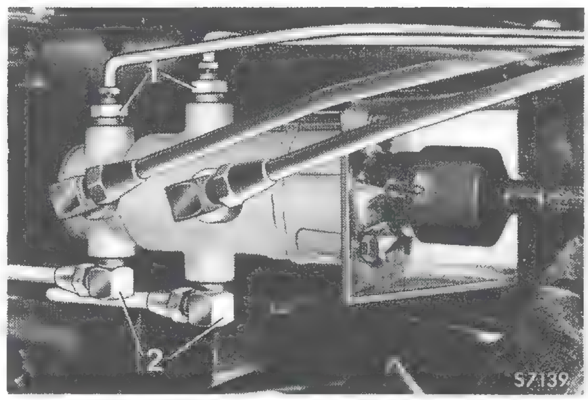
When the brake pedal is depressed, force is applied via the plunger (6) and buffer spring (7) to the front piston (5), causing the exhaust valve seat (8) on the piston to close on the inlet/exhaust valve (3). The force is also transmitted via the valve carrier (4) to the rear piston (2), causing the exhaust valve seat on the piston to close on the inlet/exhaust valve. Further pressure on the brake pedal causes the pistons to lift the inlet valves from the seat (10) in the body and seat (9) in the carrier, allowing compressed air from the dual reservoir to pass through the valve to the master cylinder actuator.

The air pressure delivered by both halves of the valve is proportional to the effort applied to the brake pedal and the valve imparts a reaction relative to the movement of the brake pedal so that the driver can sense the degree of brake application.

When the brake pedal is released, the pistons and valve carrier return under the action of spring and air pressure. This movement closes the inlet valves and unseats the exhaust valves to release the pressure in the brake lines through the exhaust diaphragm (1).

114a FOOTBRAKE VALVE – Operating Test

Operation of footbrake valve may be checked by disconnecting delivery air lines from footbrake valve, and connecting an air pressure test gauge to each port. Do not disturb air lines from dual reservoir (2), or air lines to vehicle air pressure gauge (1).



With air system fully charged, fully apply footbrake and check that pressures registered on test gauges are approximately the same as registered on vehicle gauge.

Release brake pedal and check that pressures fall immediately to zero on test gauges.

Re-charge system and gradually apply footbrake. Pressures registered on test gauges should be within 0.3 bar (5 lb/sq in.) of each other and should increase with brake pedal effort until they are approximately the same as registered on vehicle gauge. Check pressures again while slowly releasing brake pedal.

114b FOOTBRAKE VALVE – Leakage Test

Footbrake valve may be checked for leakage by fully charging system and smearing exhaust diaphragm and dust cover with soap solution. Leakage indicates faulty valve carrier sealing rings or inlet valves and/or seats.

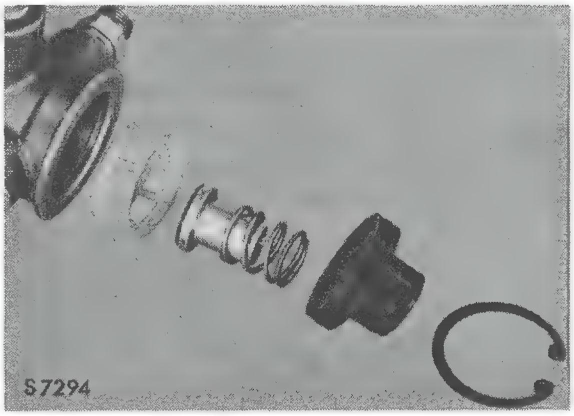
Leakage from exhaust diaphragm in excess of a one inch soap bubble in five seconds with brake pedal fully applied indicates faulty exhaust valves and/or seats, or piston sealing rings, or valve carrier rear sealing ring.

114c FOOTBRAKE VALVE – Removal and Disassembly

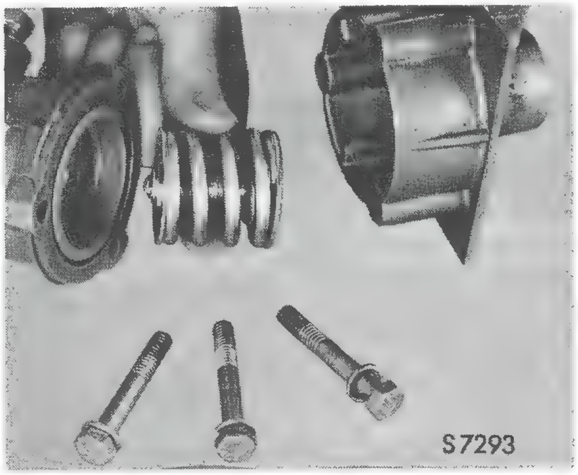
Valve should be removed complete with plunger housing to prevent ingress of dirt into valve body.

Mark position of plunger housing in relation to valve body before disassembly.

Valve guide, spring, inlet/exhaust valve and filter may be withdrawn from rear of body after removal of circlip.


S7294

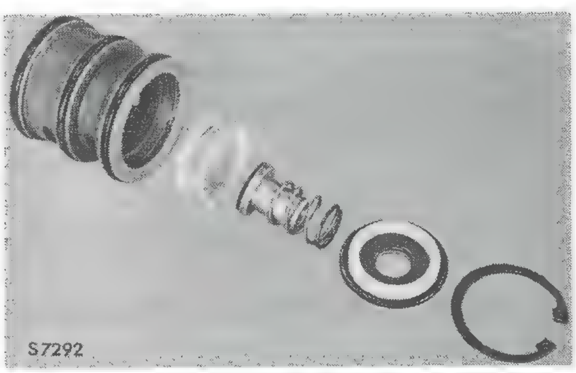
After removing plunger housing, buffer spring, retainers and ball housing may be removed as an assembly.


S7293

If necessary disassemble by removing lock-type bolt.

Front piston, valve carrier and rear piston may be pushed out of bore by means of a wooden rod inserted through rear of body. Care must be taken to avoid damaging exhaust valve seat on rear piston.
Spring and retainer may be removed from spigotted end of carrier by unwinding ring.

Valve guide, spring, filter and inlet/exhaust valve may be removed from rear of carrier after releasing circlip.


S7292

114d FOOTBRAKE VALVE — Inspection

Discard all components which will be renewed from a repair kit and clean other parts.

Inspect inlet valve seat in body and carrier, and exhaust valve seats on pistons for damage. Exhaust valve seats may be refaced on a surface plate with fine emery cloth.

Ensure breather hole in front piston and bleed hole in valve carrier and body are not obstructed.

114e FOOTBRAKE VALVE — Reassembly and Installation

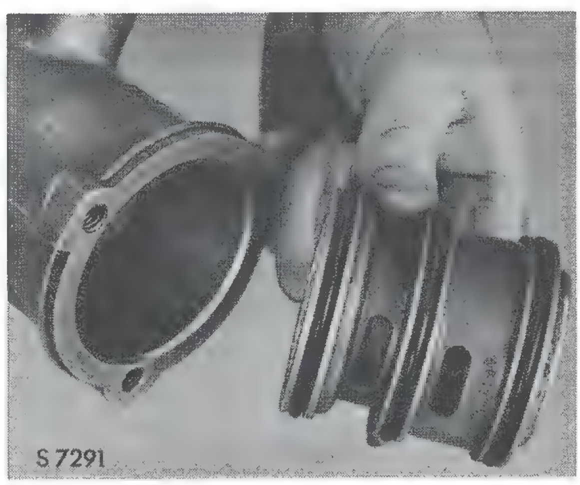
Before reassembly, liberally smear all moving parts, including seals and springs, with recommended grease.

Before installing rear piston, position spring in end of valve bore.

When installing filter, inlet/exhaust valve, spring and valve guide in carrier, depress guide only as far as necessary to locate circlip. If guide is pushed too far into bore, outer sealing ring may be displaced when guide returns against circlip causing air leakage. Inner sealing ring is located by a retainer.

S 7290

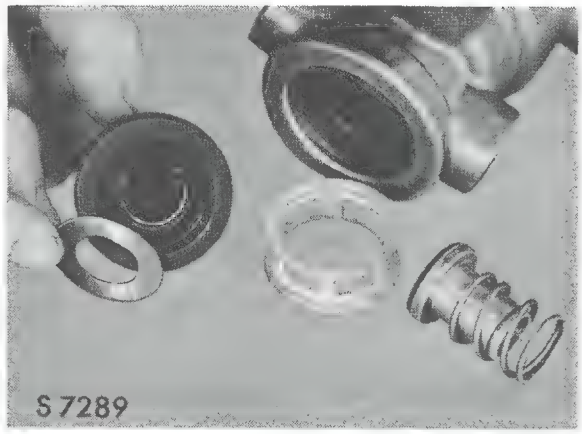
After assembling front piston spring and retainer to carrier, insert carrier into valve body with valve guide towards rear piston.



S 7291

When assembling buffer spring and ball housing ensure front retainer is not trapped between housing and bolt washer. Place assembly on piston so that ball is located in recess in centre of piston.

Before installing filter, inlet/exhaust valve and spring in rear of body, place seal retainer on valve guide.



When installing dust cover, vent must be at bottom when valve is installed on vehicle.

After installing valve, check and if necessary, adjust brake pedal setting (see Section 95a).

115 COMPRESSOR CYLINDER HEAD

The compressor cylinder head comprises a manifold and baseplate which are secured together by bolts. An unloader valve consisting of a spring-loaded plunger is incorporated in the manifold above the intake valve. The intake and exhaust valves consist of steel discs spring-loaded against seats in the manifold and baseplate.

115a COMPRESSOR CYLINDER HEAD – Air Leakage Test

Delivery valve may be checked for leakage by charging system to just below governor valve cut-out pressure. Leakage will be audible with engine stopped.

With system fully charged and engine stopped, audible air leakage indicates a faulty unloader valve plunger sealing ring.

115b COMPRESSOR CYLINDER HEAD – Removal and Disassembly

Cylinder head may be withdrawn after removal of air lines and securing nuts.

Unloader valve plunger and spring are retained by a threaded cap.

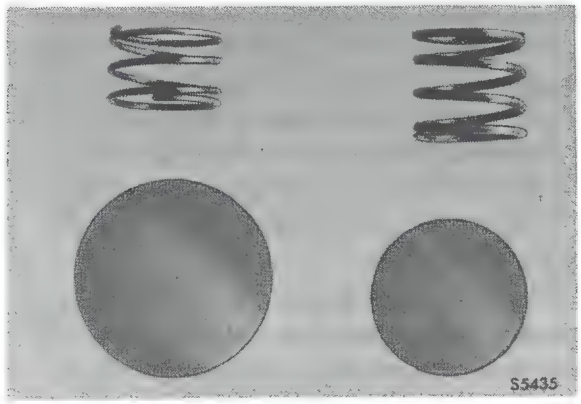
Valves and springs may be removed after separating manifold from baseplate.

115c COMPRESSOR CYLINDER HEAD – Inspection and Reconditioning

Intake and delivery valves can be refaced by lapping on very fine emery paper held on a flat surface but they should be renewed if badly grooved. Slight scratches on valve seats may be removed by lapping with fine grinding paste. If badly pitted use a seating cutter before lapping.

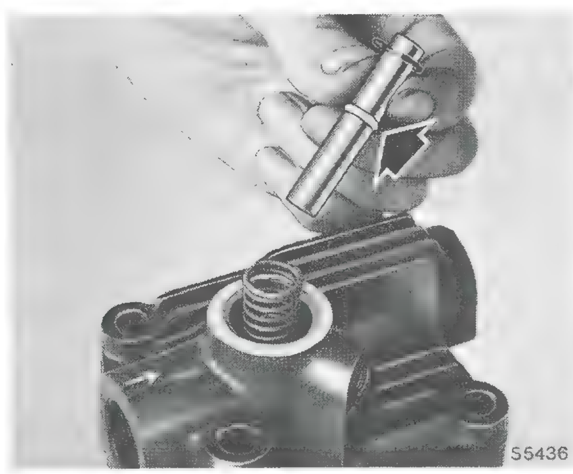
Check intake and delivery valve springs and unloader valve plunger spring for corrosion and distortion, and renew if necessary.

When reassembling cylinder head position a new gasket on baseplate and place intake valve spring in recess in baseplate. Intake valve spring is the smaller of the two valve springs and is shown with intake valve on the left. Place intake valve on spring and delivery valve on its seating. Delivery valve and spring are on the right.



Press delivery valve spring into recess in manifold and position manifold on gasket and baseplates. If necessary insert a rod through unloader plunger guide bush in manifold to hold intake valve below surface of baseplate before positioning manifold. Ensure valves are correctly positioned before installing baseplate bolts.

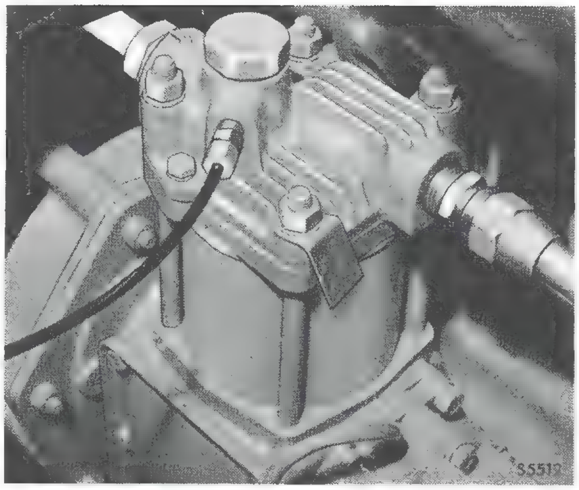
Install unloader valve using a new sealing ring (arrowed).



Install cylinder head with intake port towards drive end of compressor and tighten retaining nuts to specified torque.

116 COMPRESSOR

Compressed air for the brake system is supplied by a Clayton Dewandre Type SC9 single-cylinder, air-cooled compressor mounted on the engine timing case. The compressor is driven by the crankshaft through an idler gear and is lubricated via a pipe from the engine oil filter. Surplus oil returns to the engine crankcase through holes in the drive end of the compressor crankcase.



Output of the compressor is controlled by a governor valve. When the air pressure in the condensing reservoir reaches the governor valve setting, air passes to the cavity above an unloader valve in the compressor cylinder head. The air pressure depresses the unloader valve plunger which holds open the compressor intake valve and prevents further compression of air. When the air pressure in the reservoir falls, the governor valve exhausts the air from the unloader valve and normal functioning of the compressor is resumed.

The compressor intake may incorporate a feed from an anti-freezer unit.

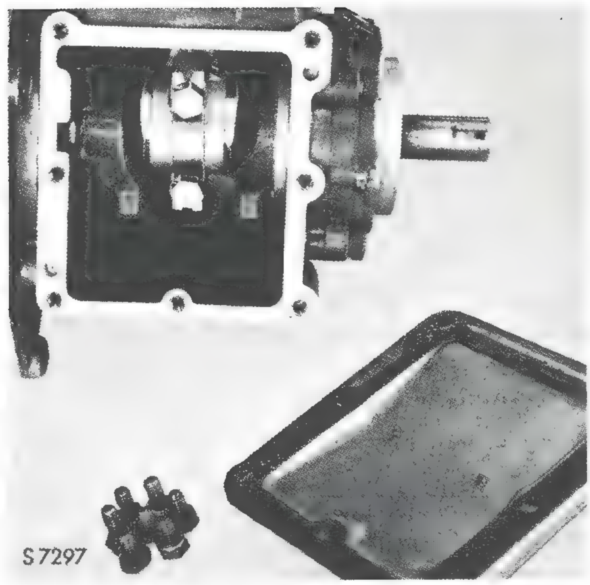
Removal and installation of the compressor is described in Training Manual TS1084.

116a COMPRESSOR – Disassembly

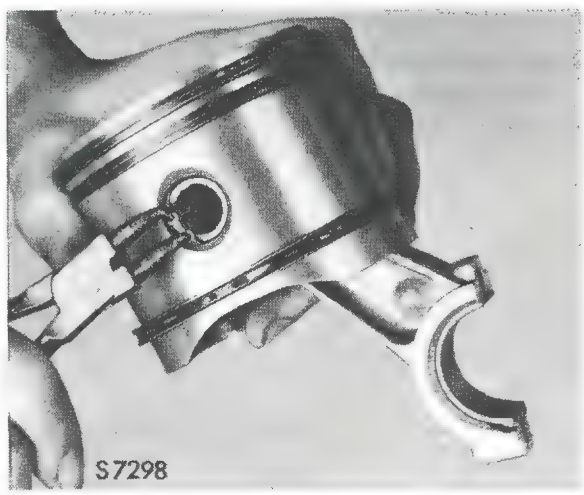
Disassemble cylinder head as previously described.

Mark position of cylinder in relation to crankcase before removal.

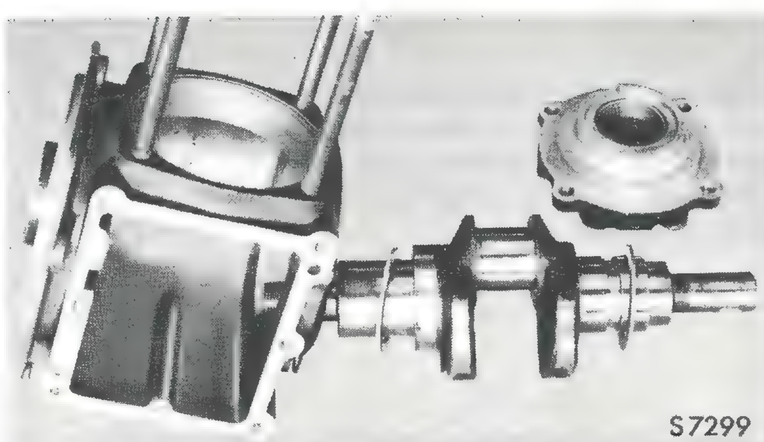
Access to connecting rod cap bolts is gained by removing side cover.



Piston pin may be pressed out of piston after removing one of the circlips.



Crankshaft and thrust washers may be withdrawn after removing end cover.

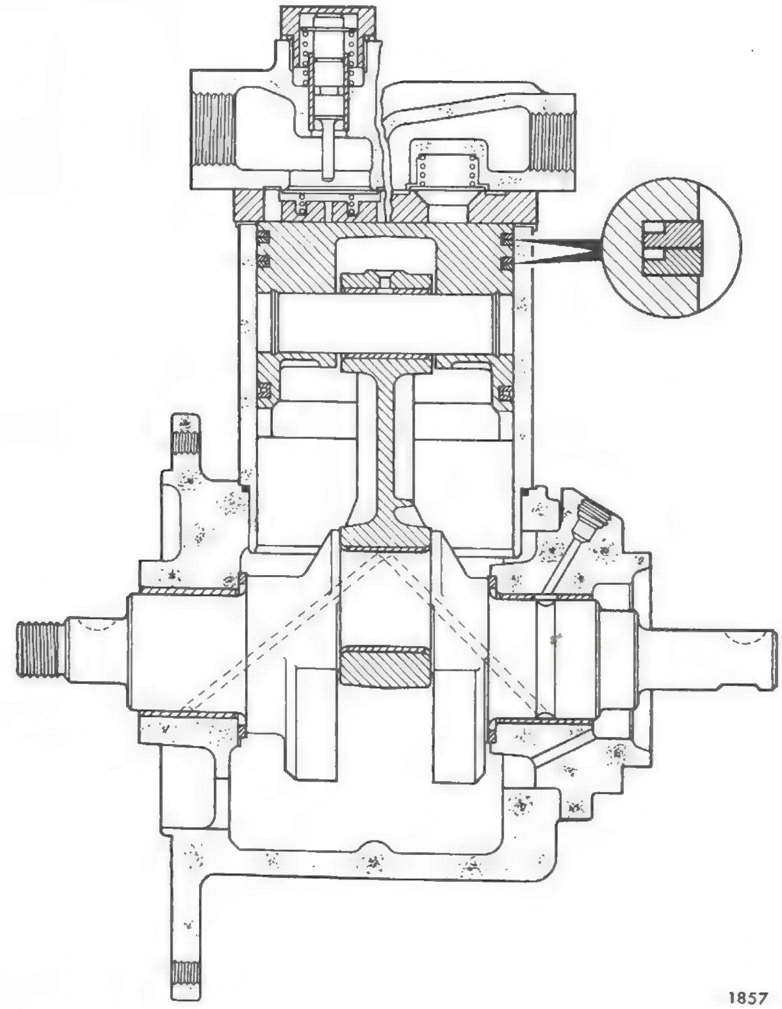


116b COMPRESSOR – Reconditioning

If new crankshaft main bearings are installed, they must be fine bored to specified diameter after installation. This operation must be carried out with end cover assembled to crankcase. Ensure oil hole in rear bearing aligns with oilway in cover.

Hone a replacement connecting rod bush to provide specified clearance for pin.

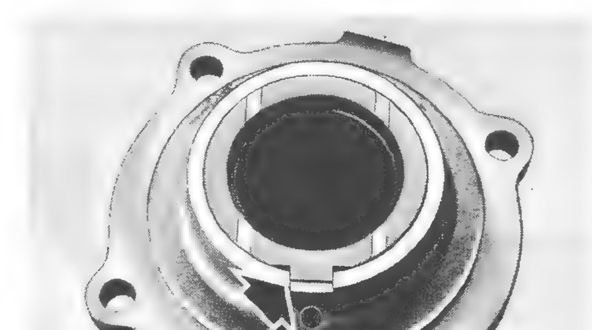
On compressors incorporating a seal in end cover, open side of seal must be adjacent to bearing.



1857

116c COMPRESSOR – Reassembly

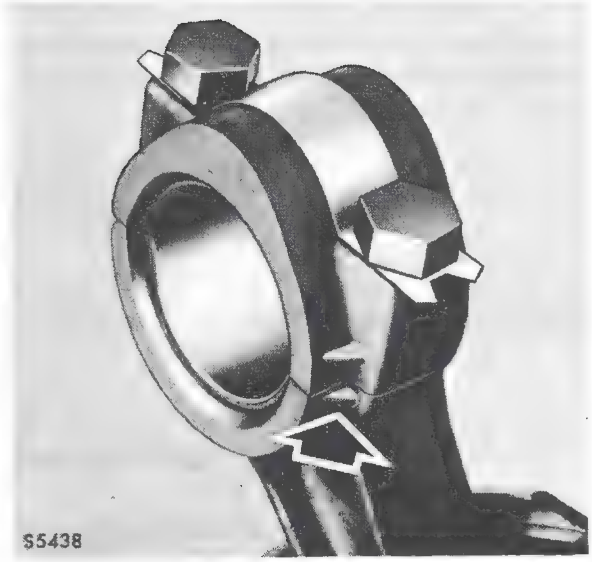
Crankshaft thrust washers must be installed with steel side towards adjacent main bearing, and ensure tab on washers engage slot in crankcase and cover. Install cover with the oil pipe connection at the top.



S5437

Compression rings must be installed with step towards piston crown.

Assemble connecting rod cap with webs (arrowed) in alignment. Tighten connecting rod bolts to specified torque and secure with lock tabs.



Before installing cylinder, assemble sealing ring to cylinder spigot.

117 CHANGE-OVER VALVE

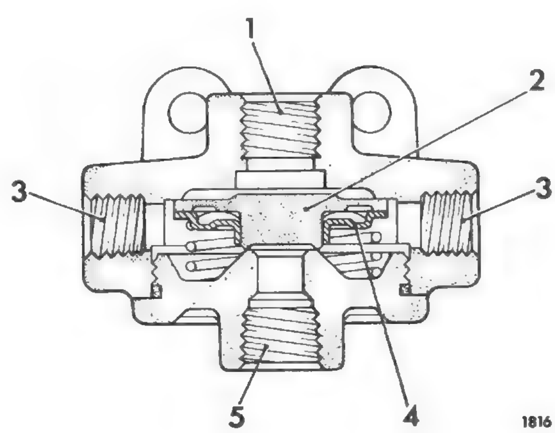
The operation and construction of the change-over valve is as described in Section 85, except that when the parking brake is released the valve prevents leakage through the footbrake valve.

Leakage at footbrake valve port of change-over valve may be detected by fully charging system and smearing exhaust diaphragm at rear of footbrake valve with soap solution. Leakage in excess of a ½ in. bubble in five seconds, with parking brake valve in 'OFF' or 'RELEASE' position, indicates a faulty shuttle valve.

118 QUICK RELEASE VALVE — Models ERT and YRQ

A quick release valve is incorporated in the air line to the spring brake actuators on Models ERT and YRQ, to reduce the time required to exhaust the air from the actuators.

The valve, which is mounted on the rear axle, consists of a body containing a diaphragm (2), spring, and spring seat (4). When the parking brake is released, air pressure from the change-over valve enters the supply port (1) of the valve and moves the diaphragm to close the exhaust port (5) in the cover. The air pressure then deflects the edge of the diaphragm and passes through the delivery ports (3) to the spring brake actuators.



When the parking brake is applied, the air pressure above the diaphragm is reduced and the spring lifts the edge of the diaphragm to close the supply port while the centre of the diaphragm is raised by air pressure to allow air from the actuators to exhaust through the port in the cover.

118a QUICK RELEASE VALVE – Operating Test

Valve may be checked for operation by fully charging air system and releasing parking brake. When parking brake is applied air should be exhausted promptly from valve.

118b QUICK RELEASE VALVE – Leakage Test

With air system fully charged and parking brake released, smear exhaust port of valve with soap solution. Leakage in excess of a one inch soap bubble in one second is not permissible.

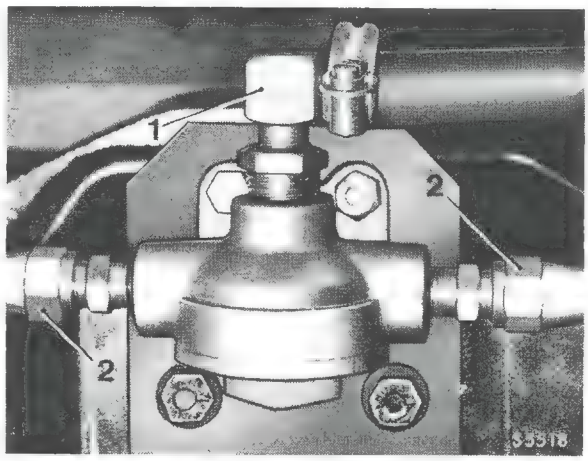
Valve is disassembled by unscrewing cover.

Inspect exhaust seat in cover for scores. Light scratches may be removed by lapping with fine emery cloth held on a flat surface but cover must be renewed if badly scored.

When reassembling valve, insert diaphragm into spring seat and place assembly in body.

Before assembling cover place spring on seat and attach sealing ring to cover.

When installing valve, connect supply air line (1) to top port, and actuator supply lines (2) to side ports.



119 PARKING BRAKE LINKAGE

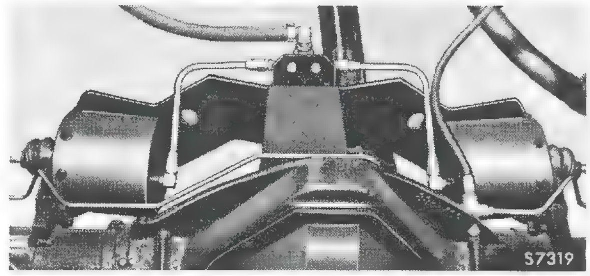
The parking brake linkage on Model EOR is as described in Section 84. On Models ERT and YRQ, the spring brake actuators are connected directly to the rear brake cylinders.

120 PARKING BRAKE CONTROL VALVE

Refer to Sections 87 and 88.

121 SPRING BRAKE ACTUATOR

The spring brake actuator is similar to that described in Sections 89 and 90, except that two actuators mounted on a support attached to the rear axle housing are used on Models ERT and YRQ. The actuators are connected directly to the brake cylinders.



When installing actuators on Model YRQ, attach actuator with longer clevis rod to right-hand side of support as viewed from rear of vehicle.

Before connecting actuator clevis rods to brake cylinders on Models ERT and YRQ, adjust rear brakes and fully charge air system. With parking brake control valve lever in 'OFF' or 'RELEASE' position adjust length of actuator clevis rods until any lost motion is just eliminated.

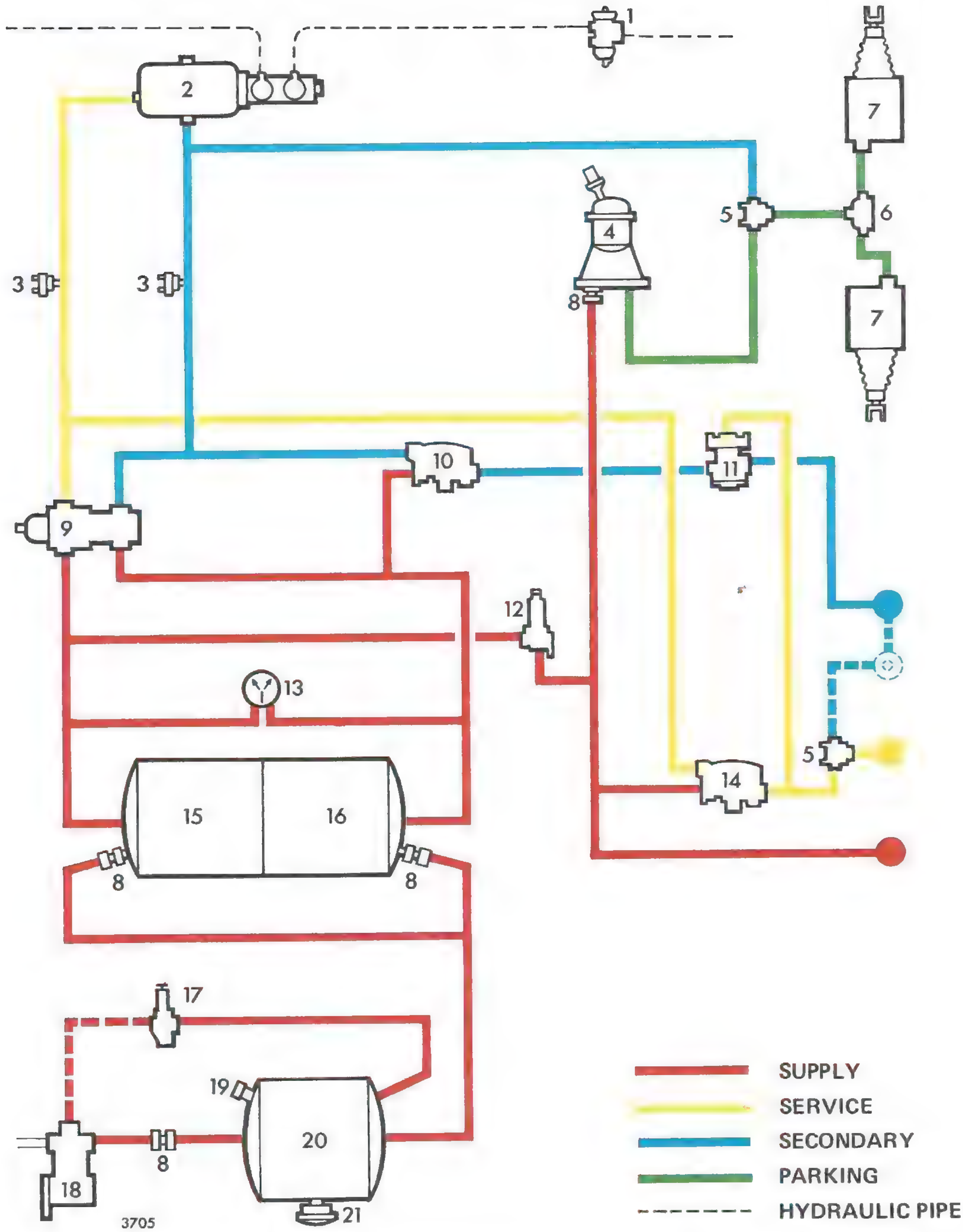
122 EMERGENCY PARKING BRAKE RELEASE

The emergency parking brake release incorporated on vehicles built to Code 665 is similar to the system described in Section 91, except that the operating valve is supplied with air from both parts of the dual air reservoir. An additional reservoir is provided to supply the secondary and parking brake systems.

123 SPRING BRAKE INTERLOCK VALVE

Refer to Section 92.

AIR PRESSURE OPERATED HYDRAULIC TRACTOR SYSTEM WITH THREE-LINE TRAILER BRAKING



1. Load sensing valve
2. Master cylinder actuator
3. Stop lamp switch
4. Parking brake control valve
5. Change-over valve
6. Quick release valve
7. Spring brake actuator
8. Non-return valve
9. Footbrake valve
10. Secondary relay valve
11. Anti-compound valve
12. Pressure loss limiting valve
13. Dual air pressure gauge
14. Service relay valve
15. Service reservoir
16. Secondary reservoir
17. Governor valve
18. Compressor
19. Safety valve
20. Condensing reservoir
21. Automatic drain valve

Schematic diagram of braking system

The air/hydraulic braking system operated by the footbrake pedal applies the tractor brakes by means of a master cylinder actuator and hydraulic tandem master cylinder. The actuator has a service and secondary means of air supply which are independent of each other and controlled by a footbrake valve. In the event of failure of the service system the secondary system remains operational to provide reduced but positive braking.

The trailer service and secondary air lines, also controlled by the footbrake valve, are provided with yellow (service line) and blue (secondary line) flexible connecting hoses. The trailer emergency air line, fed from the tractor service reservoir has a red flexible connecting hose and has two functions, (a) it supplies air to the trailer reservoir, and (b), in conjunction with a relay and inverted relay valve mounted on the trailer, provides a means of automatically applying the trailer brakes should the emergency line fail as in the event of trailer break-away.

Also provided on the flexible hose support is a coupling head to which the secondary line flexible hose should be connected when a trailer having a two-line braking system is used with the vehicle. This enables the tractor secondary system to operate through the service line coupling via a change-over valve.

A parking brake control valve operates the brakes on the rear wheels by means of a spring brake actuator and mechanical linkage (Models EJQ8 and EPR8) or two spring brake actuators and a quick release valve (Model ERT8).

When the parking brake is applied air is exhausted from the spring brake actuators and the brakes are held on by spring pressure. Provision is made in the condensing reservoir for the attachment of an independent air supply should it become necessary to move the vehicle while the engine is inoperative.

A dual air pressure gauge in the instrument panel indicates the service and secondary reservoir pressures.

The hydraulic brakes on Models EJQ8 and EPR8 are of the leading/trailing shoe type operated by double acting brake cylinders.

The hydraulic brakes on Model ERT8 are of the two-leading-shoe type.

124 BRAKE ADJUSTMENT

The brake adjustment for the leading/trailing shoe brakes on Models EJQ8 and EPR8, and the two leading shoe brakes on Model ERT8 is as described in Section 93.

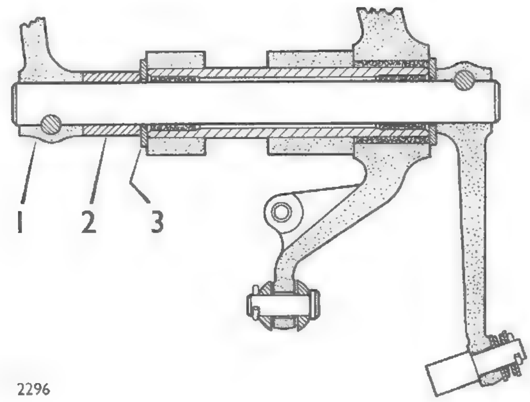
125 BLEEDING THE HYDRAULIC SYSTEM

Refer to Section 94.

126 BRAKE PEDAL AND LINKAGE

The brake pedal and linkage is similar to that described in Section 20 except that the relay lever pivots on a non-metallic bush and is connected, by a push rod, to the footbrake valve.

On left drive models with power-assisted steering a spacer (2) is installed between washer (3) and clutch pedal (1).



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On right drive vehicles with power assisted steering the pedal side clearance is not adjustable.

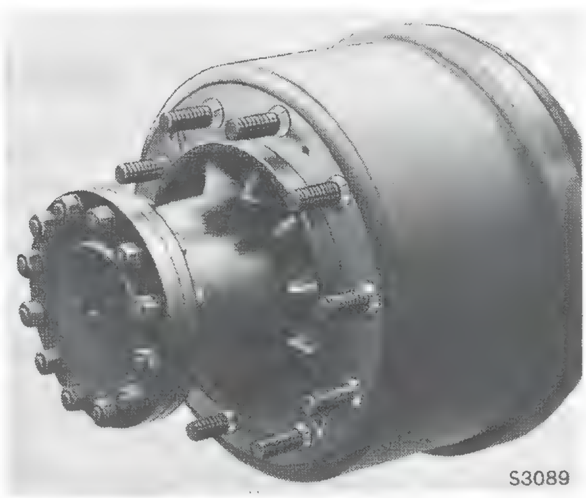
126a BRAKE PEDAL SETTING

Refer to Section 95a.

127 BRAKE DRUMS

The brake drums on Models EJQ8 and EPR8 are similar to those used with suspended-vacuum servo-assisted brakes and the information contained in Section 34 may be applied.

The brake drums on Model ERT8 locate on the wheel bolts and are attached to the outside of the hubs by countersunk screws. Loose split cones on the wheel bolts locate the wheels.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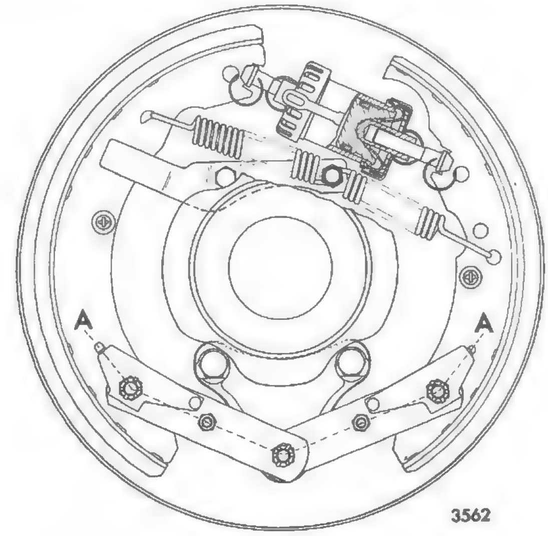
Hubs and drums should be removed and installed as assemblies as described in Training Manuals TS 1085 and TS 1086.

When assembling a new drum to hub, ensure mating surfaces are clean and free from damage.

128 FRONT BRAKE SHOES

The front brakes on Model ERT8 are similar to those described in Section 97 for Model ERT.

The front brakes on Models EJQ8 and EPR8 are similar to those described in Section 5 except that each shoe is provided with a drum-type adjuster and individual pull-off spring. The leading shoe is provided with a support attached to the flange plate.



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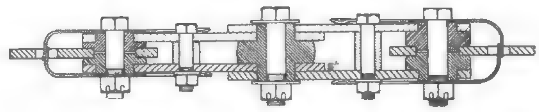


SECTION A-A 3712

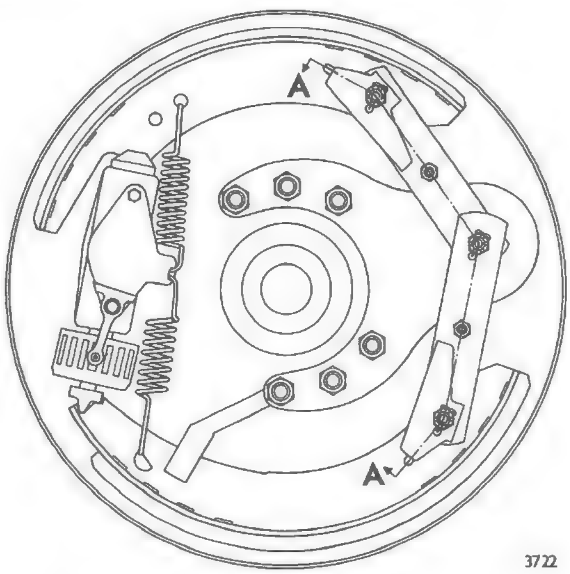
When refacing shoes install shorter rivets in eight holes nearest centre of shoe.

When assembling pull-off springs attach squared end to brake shoe and ensure spring with greater number of coils is attached to D-shaped hole in leading shoe.

129 REAR BRAKE SHOES

The rear brakes on Model ERT8 are similar to those described in Section 98 for Model ERT.

The rear brakes on Models EJQ8 and EPR8 are similar to those described in Section 6 except that drum-type shoe adjusters actuated by a sprocket attached to a square headed spindle are used. The leading shoe is provided with a support retained by the anchor plate bolts.



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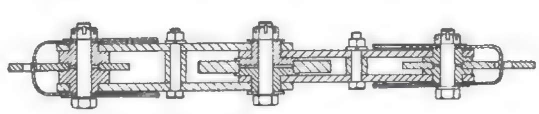
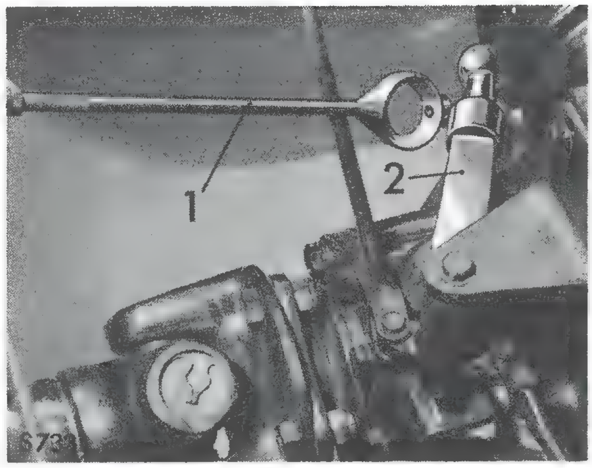


SECTION A-A 1394



Before removing hub and drum assembly, fully charge air system, release parking brake, and disconnect pull rod eye (1) from bell crank lever (2) on rear axle.

When refacing shoes, install shorter rivets in eight holes nearest centre of shoe.

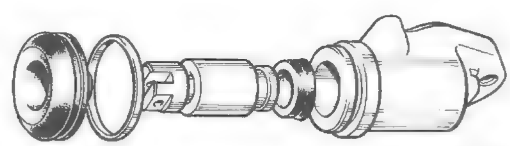
When assembling pull-off springs attach squared end to brake shoe and ensure spring with larger coils is attached to leading shoe.

When connecting pull rod eye to bell crank lever, tighten screw fully and slacken a quarter of a turn before securing with locknut.

130 FRONT BRAKE CYLINDERS

The front brake cylinders on Models EJQ8 and EPR8 are similar to those used with suspended-vacuum servo-assisted brakes and the information contained in Section 37 may be applied.

The front brake cylinders on Model ERT8 are bolted to the inside of the flange plates and contain a piston and seal protected by a dust cover attached to the open end of the cylinder.



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Seal lip faces towards inner end of piston.

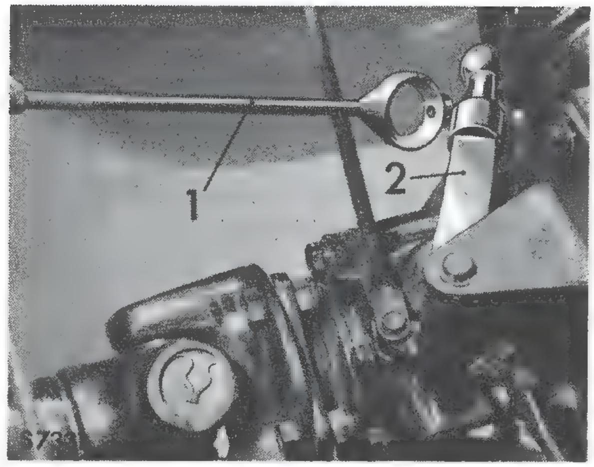
Before assembling cylinder, smear piston and cylinder bore with recommended brake fluid.

131 REAR BRAKE CYLINDERS

The rear brake cylinders on Model ERT8 are as described in Section 100 for Model ERT.

The rear brake cylinders on Model EJQ8 and EPR8 are similar to those used with direct-vacuum servo-assisted brakes and the information contained in Section 8 may be applied.

Before disconnecting rods, fully charge air system and, with parking brake released, detach pull rod eye (1) from bell crank lever (2) on rear axle.



After installing cylinder, adjust length of rods as described in Section 153a.

132 REAR BRAKE BISECTORS

The rear brake bisectors on Models EJQ8 and EPR8 are similar to those used with direct-vacuum servo-assisted brakes and the information contained in Section 9 may be applied except for the brake cylinder removal and installation procedure described under the previous heading.

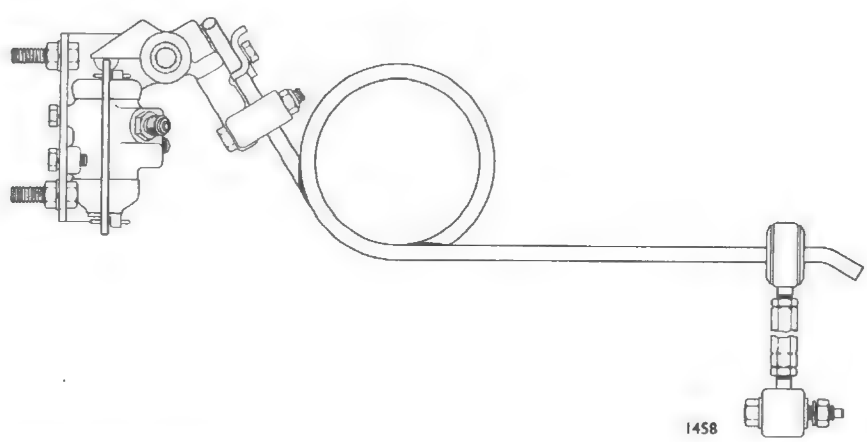
133 REAR BRAKE EXPANDERS

Refer to Section 102.

134 MASTER CYLINDER

Information concerning the master cylinder is contained in Section 56. The check valves on Model ERT8 do not incorporate a by-pass hole.

135 LOAD SENSING VALVE



The Girling load sensing valve, which is installed in the hydraulic line to the rear brakes, controls the braking effort at the rear wheels in proportion to the load carried on the rear axle.

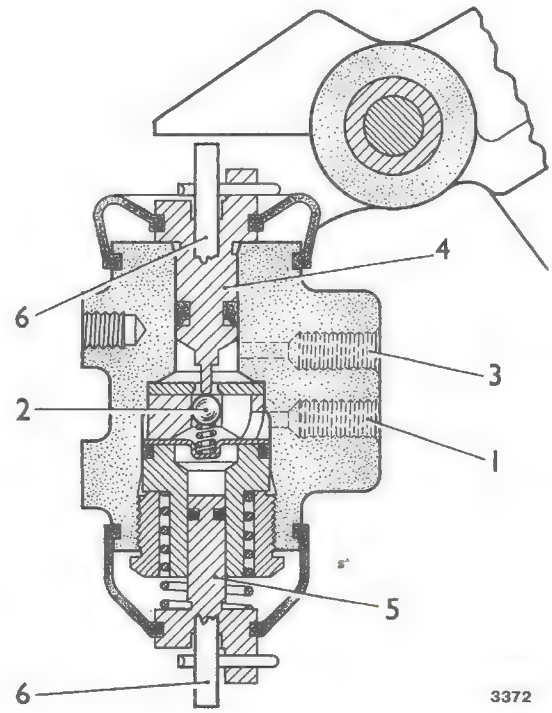
The valve is mounted on the chassis crossmember (Models EJQ8 and EPR8) or sidemember (ERT8) and is operated by a pair of sensing springs connecting the valve operating lever to an adjustable link attached to the rear axle.

135 LOAD SENSING VALVE (contd)

Operation of the valve is effected by using two different diameter pistons working in opposition. The movement of the pistons, when balancing opposing forces, opens and closes a ball valve.

With an unladen vehicle, the initial pressure on the footbrake causes the brake fluid to flow through the valve intake port (1), past the ball valve (2) and out of the outlet port (3) to the rear brake cylinders.

As the pedal pressure increases, the resulting fluid pressure increase forces the larger diameter piston (4) upwards to allow the valve ball to return to its seating. This stops the flow of fluid through the valve until the pressure difference between the intake and outlet sides becomes sufficient to push down the lower piston (5), carrying with it the yoke (6) and upper piston, thus re-opening the valve. This results in an increase in pressure on the upper piston causing it to rise again until the valve closes.



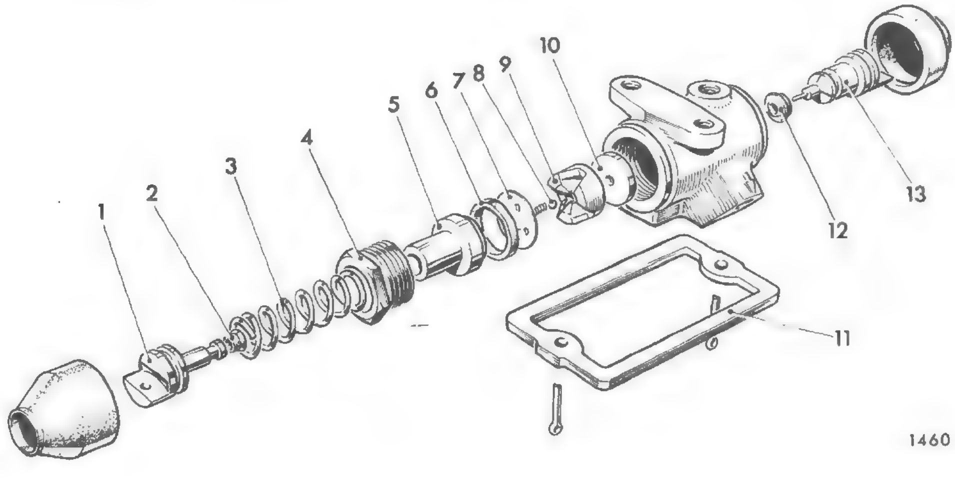
This sequence is repeated until balance is achieved.

When the vehicle is loaded, the sensing spring applies a downward force to the pistons in proportion to the load and a greater fluid pressure will be necessary to move the upper piston to close the ball valve.

With a fully laden vehicle, the sensing spring load is sufficient to prevent the ball valve closing even at maximum fluid pressure. In this condition, fluid flows through the valve without restriction.

135a LOAD SENSING VALVE – Disassembly and Inspection

After removing split pins securing pistons to yoke, secure valve in a soft-jawed vice with spring-loaded piston uppermost.



Piston (1), spring (3) and dust cover may be withdrawn after depressing piston and moving yoke (11) towards valve attaching flange.

Sleeve (5), seal (6), spring plate (7) and ball (8) may be withdrawn after unscrewing plug (4). Ball housing (9) and valve seat washer (10) may also be removed.

After removal of remaining piston (13) and dust cover, yoke may be withdrawn.

Discard all components which will be renewed from a repair kit, including seals (2 and 12), and wash other parts in clean brake fluid.

If pistons, valve body, or valve seat washer are worn or damaged, valve assembly should be renewed.

135b LOAD SENSING VALVE — Reassembly

Before assembly, smear sealing edges of dust covers with recommended grease, and cylinder bore and pistons with brake fluid.

Install valve seat washer with chamfer in bore uppermost to provide a seat for valve ball.

Install ball housing with flat side against washer.

After installing seal on sleeve, press sleeve into valve bore to align seal and tighten plug to specified torque.

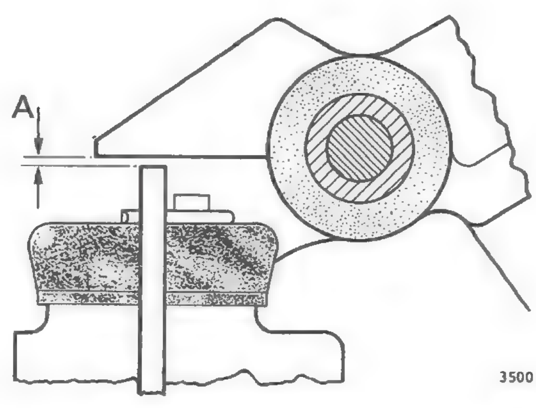
Before securing pistons with yoke, ensure pin holes in pistons are towards hydraulic ports in valve body.

Rubber seals coloured blue should be lubricated with grease before installation on pivot bolt, one each side of operating lever. Tighten pivot bolt to specified torque.

135c LOAD SENSING VALVE — Installation

When installing valve, tighten bolts securing valve to mounting bracket to specified torque.

Check that dimension 'A' between operating lever and valve yoke is 0.065 in. when tractor has no trailer attached. Setting may be adjusted by means of link attached to rear axle.



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136 NON-RETURN VALVES

Non-return valves, identical to those described in Section 75, are incorporated in the service and secondary reservoir supply connections and in the parking brake control valve supply line. In addition, a line non-return valve is included in the air line between the compressor and the condensing reservoir. When installing valve, arrow on body must be in direction of condensing reservoir.

137 SAFETY VALVE

Refer to Section 105.

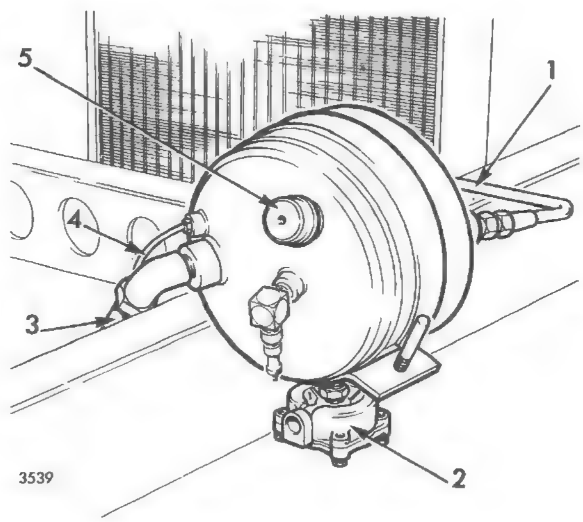
138 STOP LAMP SWITCHES

The stop lamp switches are as described in Section 106 except that they are incorporated in the air lines between the footbrake valve and each relay valve.

139 CONDENSING RESERVOIR

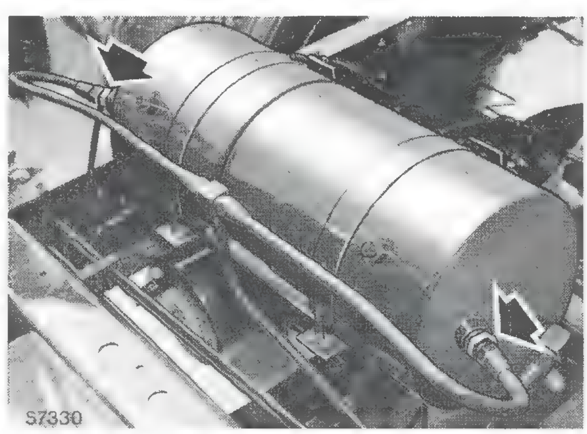
A condensing reservoir, fed by air from the compressor via a non-return valve and air line (3), is mounted on the chassis sidemember at the front of the vehicle to ensure maximum air cooling and condensation of water vapour.

The reservoir is fitted with an automatic water drain valve (2) and a non-adjustable ball-type safety valve (5). Air lines (1 and 4) supply the dual air reservoir and compressor governor valve respectively.



140 DUAL AIR RESERVOIR

A dual reservoir comprising a service air reservoir and a secondary air reservoir combined in one assembly is mounted on the chassis crossmember. The reservoirs, which are fed with dry air from the condensing reservoir via non-return valves (arrowed), supply air to the footbrake valve, and the service reservoir also supplies the trailer emergency line via a pressure loss limiting valve.



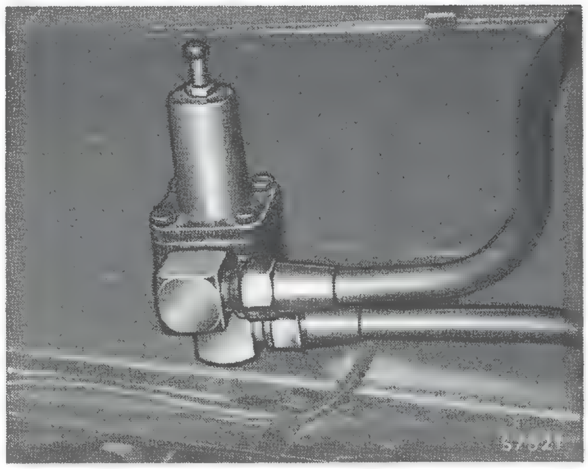
The reservoirs are provided with drain plugs.

141 AUTOMATIC DRAIN VALVE

Refer to Section 110.

142 PRESSURE LOSS LIMITING VALVE

To prevent complete loss of air from the service reservoir in the event of severe air leakage in the trailer emergency and/or service air lines, or the parking brake system, a pressure loss limiting valve is incorporated in the system.



The valve consists of a body and cover containing a spring, adjusting screw, diaphragm, valve and valve seat.

Compressed air from the service reservoir enters the valve beneath the diaphragm. When the air pressure is sufficient to overcome the spring pressure the valve opens to allow air to pass to the trailer emergency coupling, service relay valve and parking brake control valve.

142a PRESSURE LOSS LIMITING VALVE — Operating Test

Valve may be checked for operation by fully charging air system and, with engine stopped, applying and releasing parking brake.

When spring brake actuator(s) fail to release, note pressure registered on service reservoir gauge. If cut-out pressure is not within specified limits adjust valve spring tension by means of screw in cover.

142b PRESSURE LOSS LIMITING VALVE — Leakage Test

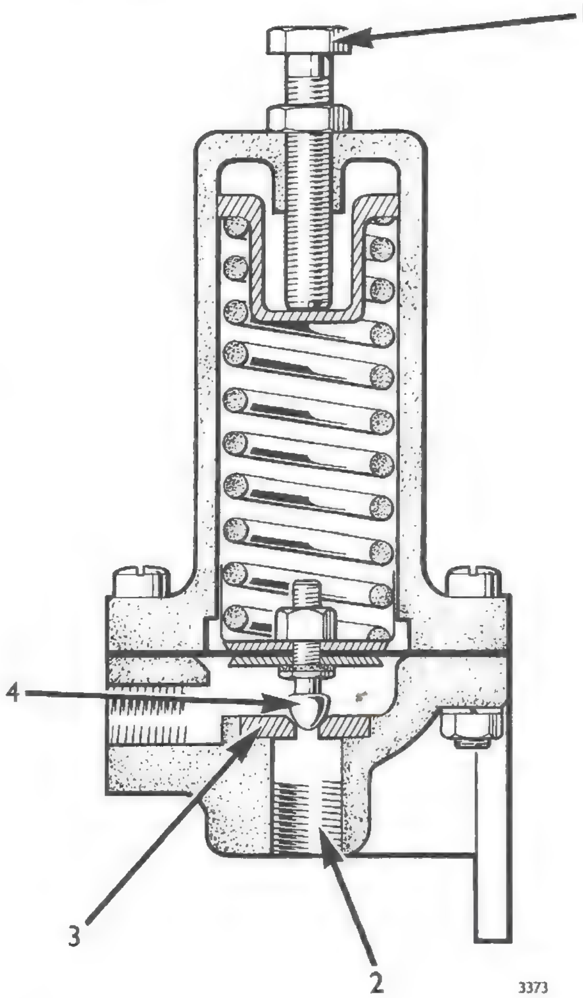
Valve may be checked for leakage by fully charging air system and smearing body and cover with soap solution. Leakage from cover indicates a faulty diaphragm.

When disassembling valve, back off adjusting screw (1) before progressively slackening cover bolts.

Valve seat (3) may be removed by inserting a drift through delivery port (2).

Diaphragm and valve assembly (4) together with valve seat are contained in repair kit.

After pressing valve seat into body, lightly tap a $^5/_{16}$ in. diameter steel ball on to seat to form an air tight seating for valve.



After installing valve on vehicle, carry out operating test.

143 COMPRESSOR GOVERNOR VALVE

The compressor governor valve is similar to that described in Section 60. The cut-out pressure may be checked on the vehicle dual air pressure gauge.

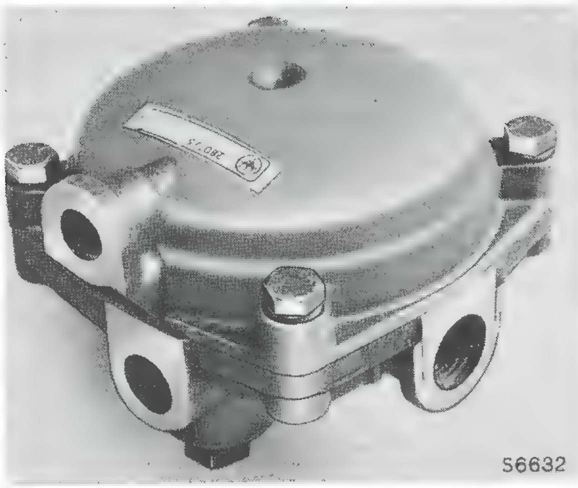
144 COMPRESSOR ANTI-FREEZER

Information concerning the compressor anti-freezer, which may be connected to the compressor intake, is contained in Section 258.

145 MASTER CYLINDER ACTUATOR

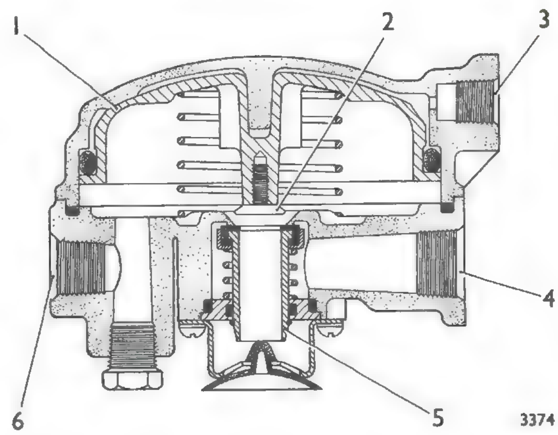
Refer to Section 113.

To eliminate time lag during trailer brake application and release, a relay valve is incorporated in the trailer service and secondary brake lines on the vehicle. The valves, which are mounted on the inside of the chassis side-members, provide a direct means of air supply from the service air reservoir to the trailer service line coupling (service relay valve), and from the secondary air reservoir to the trailer secondary line coupling (secondary relay valve).



The valves are identical in construction and operation and consist of a body and cover containing a spring loaded piston and an inlet/exhaust valve assembly.

Air pressure delivered from the footbrake valve enters the top of the valve through the signal port (3), causing the piston (1) to move down until the exhaust valve seat (2) contacts the inlet valve (5). Further increase in this air pressure causes the inlet valve to move off its seat allowing air direct from the reservoir to enter the valve through the supply port (4) and exit from the delivery port (6).



The pressure of the air passing through the valve acts on the lower face of the piston causing the piston to rise and close the inlet valve when the pressure below the piston is equal to that above, so bringing the valve into a balanced condition.

Any further increase in the pressure delivered from the footbrake valve will cause the piston to move down and open the inlet valve, increasing the delivered pressure from the valve until balance is once again achieved.

A decrease in the pressure delivered from the footbrake valve will cause the piston to rise and the exhaust valve to open, allowing the pressure delivered from the valve to exhaust through the centre of the inlet valve and out through the exhaust diaphragm until balance is once again achieved.

When no air pressure is being delivered from the footbrake valve the piston is in the fully raised position with the exhaust valve open and the inlet valve closed.

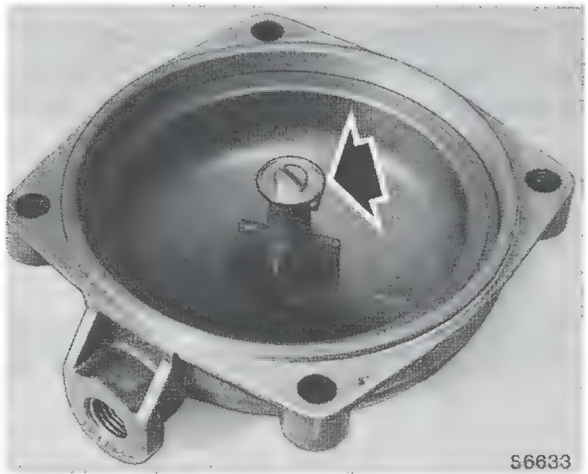
146a RELAY VALVES – Operating and Leakage Test

To test for correct operation of valve connect an air supply of constant pressure to supply port and a variable air supply to signal port. Check that air pressure delivered from valve at delivery port reacts immediately and in accordance with air pressure at the signal port.

With valve in a balanced condition check for leaks with soap solution. No leakage is permissible.

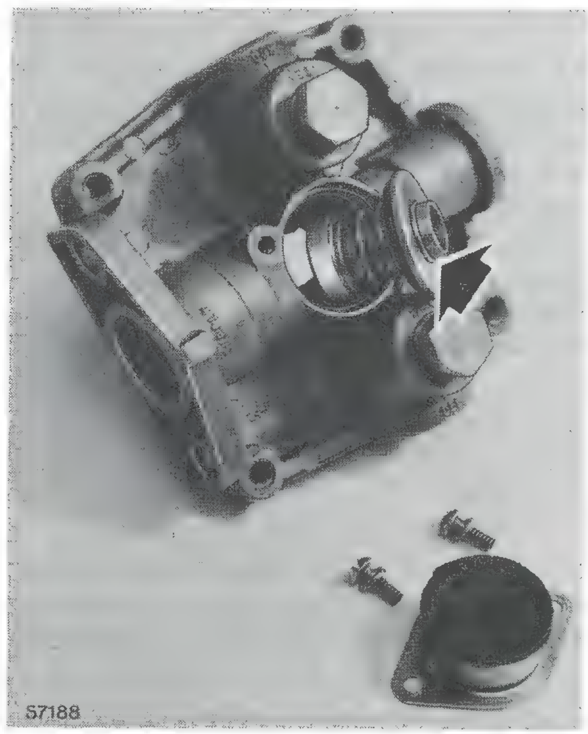
146b RELAY VALVES – Disassembly

Removal of four bolts securing top cover provides access to piston, piston return spring and exhaust valve seat (arrowed).



Access to inlet valve assembly is gained after removal of retainer.

Inlet/exhaust valve, spring and valve support may be separated from guide by removing circlip.



146c RELAY VALVES – Inspection and Reassembly

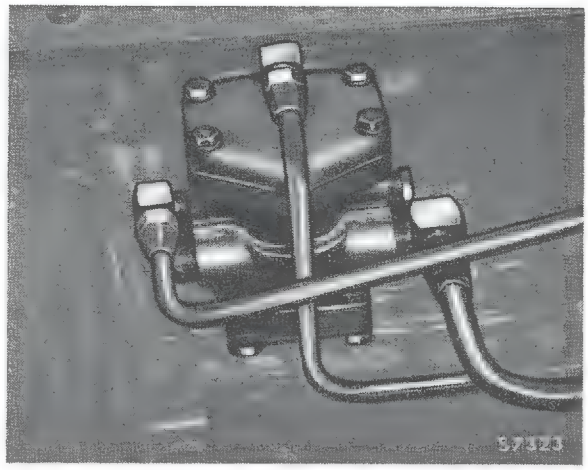
Discard all components which will be renewed from a repair kit.

Inspect sliding surfaces of piston and cover for wear and scores.

On reassembly, liberally smear all sliding surfaces and seals with recommended grease.

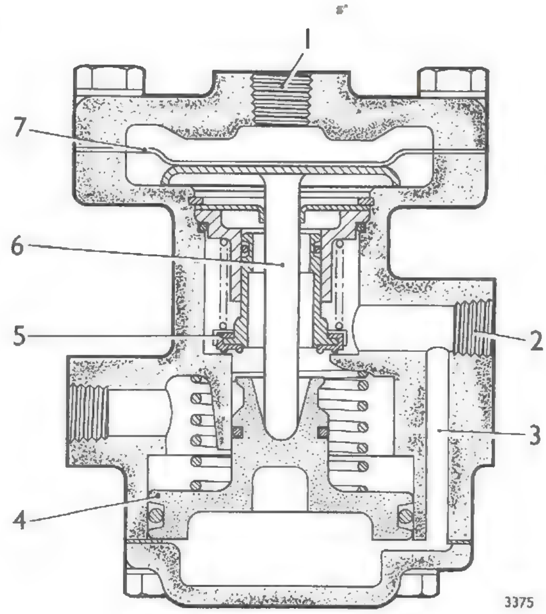
147 ANTI-COMPOUND VALVE

The anti-compound valve, mounted on the chassis sidemember, prevents simultaneous application of both the service and secondary trailer brake systems.



When the service brake system is being operated, compressed air from the trailer service line enters the top cover (1) and exerts a downward force on the diaphragm (7) and push rod (6). At the same time, compressed air from the secondary relay valve enters the supply port (2) in the side of the valve and passes down the drilling (3) in the body to act on the bottom of the piston (4). As the area of the diaphragm is greater than the effective area of the piston, the inlet valve (5) remains closed and compressed air is prevented from reaching the trailer secondary coupling.

In the event of failure of the service system, the pressure on the diaphragm is relieved and the piston contacts the inlet/exhaust valve and opens the inlet valve, allowing compressed air to pass from the secondary relay valve to the trailer secondary coupling.



The valve is capable of graduating the pressure supplied to the trailer secondary coupling in relation to that being supplied to the service coupling so that neither is at maximum at the same time.

The air pressure in the trailer secondary system also reacts on the upper surface of the piston and combines with the thrust of the return spring to move the piston down the bore until a balance condition is achieved where both inlet and exhaust valves are closed.

When the brakes are released, the piston returns against the bottom cover, opening the exhaust valve and allowing the air in the trailer secondary line to exhaust through the port at the rear of the valve.

147a ANTI-COMPOUND VALVE — Operating Test

To check operation of valve, fully charge air system and apply footbrake. Depress plunger in secondary line coupling head and check that no air escapes.

Exhaust air from service reservoir by means of drain plug and from condensing reservoir by depressing wire in exhaust port of automatic drain valve.

With footbrake applied, again depress plunger in secondary line coupling head and check that coupling is pressurized.

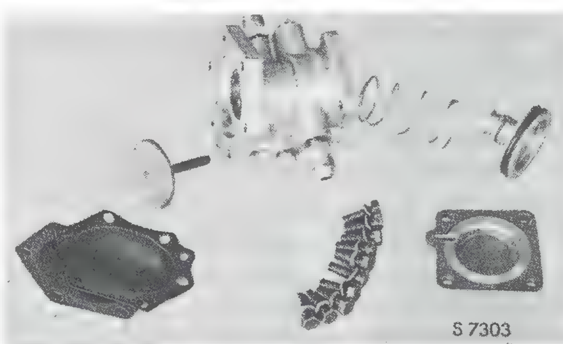
147b ANTI-COMPOUND VALVE — Leakage Test

Valve may be checked for leakage by fully charging air system and applying footbrake. Leakage from exhaust port at rear of valve indicates a faulty diaphragm, piston sealing ring or inlet valve.

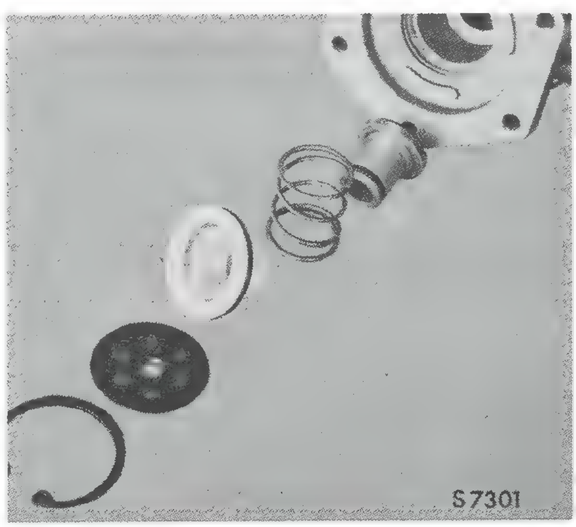
With air exhausted from service and condensing reservoirs as described in Section 147a, apply footbrake and again check for leakage from valve exhaust port. Leakage indicates a faulty piston sealing ring or exhaust valve.

147c ANTI-COMPOUND VALVE — Disassembly and Inspection

Piston, spring, diaphragm and diaphragm plate may be withdrawn after removing top and bottom covers.



Inlet/exhaust valve, spring, valve guide and push rod guide are retained by a circlip.



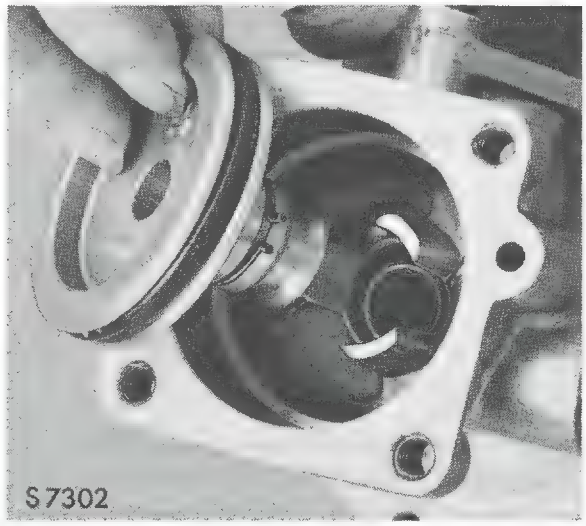
Discard all components which will be renewed from a repair kit.

Examine all sliding surfaces for wear or scores including contact areas on piston spring ring lugs in body.

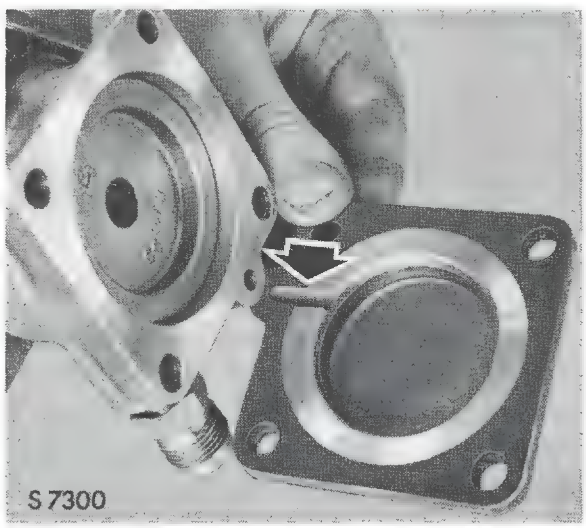
147d ANTI-COMPOUND VALVE – Reassembly

Before reassembly, lightly smear sealing rings, push rod and sliding surfaces of piston, body, valve guide and inlet exhaust valve with recommended grease.

When installing piston, ensure ends of spring ring locate in a gap between lugs in body.


S 7302

When installing bottom cover ensure recess aligns with drilling in valve body.


S 7300

Before installing circlip, ensure flanged side of push rod guide is towards inlet/exhaust valve.

148 FOOTBRAKE VALVE

The footbrake valve is similar to that described in Section 114 except that the valve also controls the service and secondary air lines to the trailer.

149 COMPRESSOR CYLINDER HEAD

Refer to Section 115.

150 COMPRESSOR

Refer to Section 116.

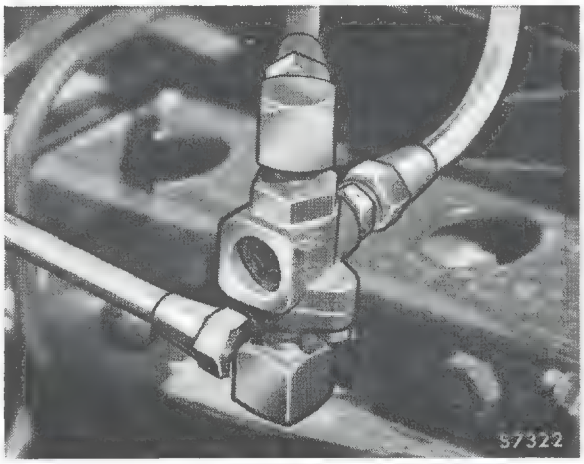
151 CHANGE-OVER VALVES

A change-over valve is incorporated in the system to prevent compound application of the rear brakes by means of the spring brake actuator(s) and the hydraulic system.

The operation and construction of the change-over valve is as described in Section 85, except that when the parking brake is released the valve prevents leakage through the footbrake valve. Leakage at footbrake valve port of change-over valve may be detected by fully charging system and smearing exhaust diaphragm at rear of footbrake valve with soap solution.

Leakage in excess of a ½ in. bubble in five seconds, with parking valve in 'OFF' or 'RELEASE' position indicates a faulty shuttle valve.

A change-over valve is also incorporated in the air line to the trailer service coupling head to enable the tractor secondary system to operate through the service line coupling when a trailer having a two-line braking system is used with the vehicle.



When a trailer having a three-line brake system is used with the vehicle, the change-over valve prevents air leakage through the secondary-park coupling head.

When a trailer having a two-line brake system is used with the vehicle, the secondary line flexible hose must be connected to the secondary-park coupling head and the change-over valve prevents air leakage through the service relay valve.

Change-over valve may be checked for leakage by fully charging air system and smearing secondary-park coupling head with soap solution. Leakage in excess of a ½ in. bubble in five seconds, with footbrake applied, indicates a faulty shuttle valve.

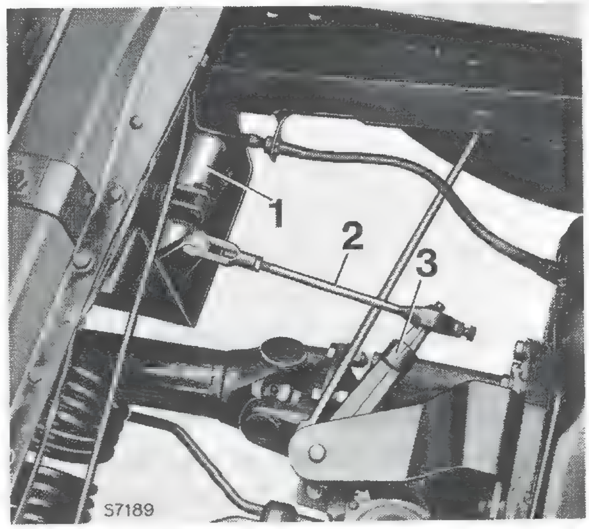
With secondary line flexible hose connected to secondary-park coupling head, exhaust air from service reservoir by means of drain plug, and from condensing reservoir by depressing wire in exhaust port of automatic drain valve. Check for air leakage from exhaust diaphragm on service relay valve with footbrake applied. Leakage in excess of a ½ in. soap bubble in five seconds indicates a faulty shuttle valve.

152 QUICK RELEASE VALVE

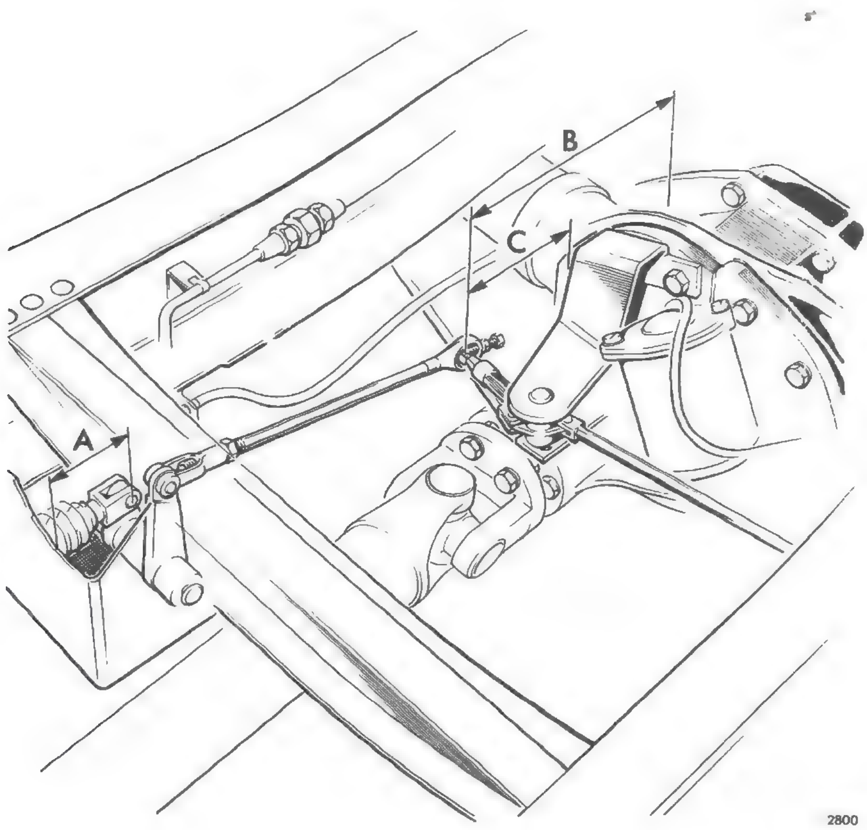
The quick release valve on Model ERT8 is as described in Section 118.

153 PARKING BRAKE LINKAGE

The parking brake linkage on Models EJO8 and EPR8 comprises a horizontal relay lever (1) which pivots in the spring brake actuator support bolted to the chassis crossmember. The lever is connected by an adjustable pull rod (2) to a vertically mounted bell crank lever (3) attached to the rear axle casing. Adjustable rods connect the bell crank lever to the rear brake cylinders.



153a PARKING BRAKE LINKAGE – Adjustment



With air system fully charged and parking brake released, remove pull rod and pull clevis rod out of spring brake actuator to full extent of its travel. Check that dimension 'A' between actuator body and centre of clevis is 5.88 in. If adjustment is necessary, detach gaiter from actuator clevis and slacken pull rod lock nut. Turn pull rod clockwise as viewed from clevis to increase dimension or anti-clockwise to decrease.

It is essential that system is fully charged and parking brake control valve is in 'OFF' or 'RELEASE' position during this operation.

153a PARKING BRAKE LINKAGE – Adjustment (contd)

With rear brakes correctly adjusted, slacken locknuts on brake cylinder pull rods and rotate rods until bell crank lever is centralized in slot of lower bracket and dimension 'B' is 6.69 in. (single-speed axle) or dimension 'C' is 4.59 in. (two-speed axle).

Access to pull rod locknuts is gained by detaching spring and gaiter from each brake cylinder.

When adjusting length of rods eliminate free travel in brake cylinder link by lightly pulling rods away from cylinder.

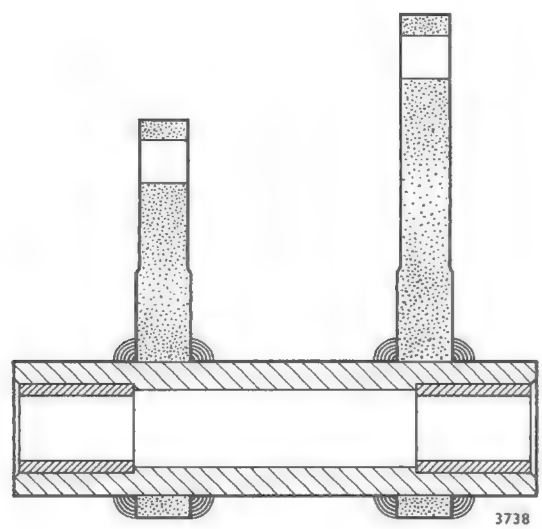
Install brake cylinder gaiters with vent at bottom.

Before connecting pull rod to relay lever, fully tighten pull rod eye bolt and back off a quarter of a turn. Secure bolt with locknut.

When connecting pull rod to relay lever, fully charge air system, release parking brake and adjust rod clevis until all free play is just eliminated without causing brakes to bind.

153b PARKING BRAKE RELAY LEVER

The relay lever pivots on a pin through the spring brake actuator support and is provided with non-metallic bushes.



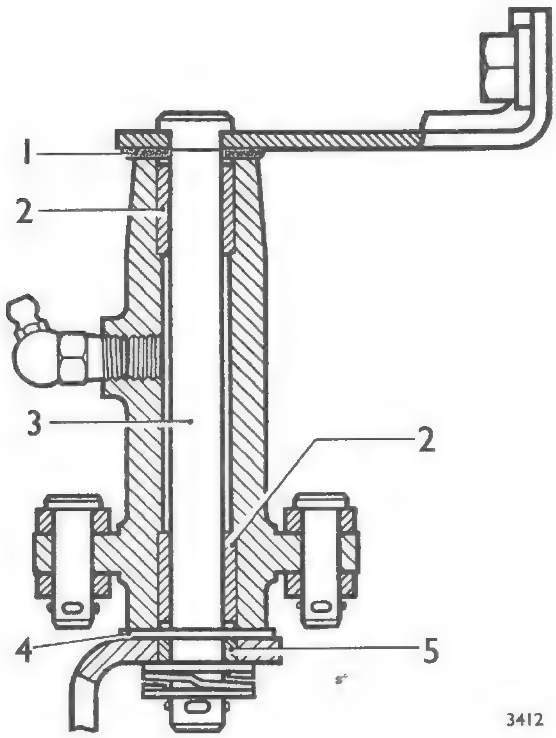
Replacement bushes do not require reaming on assembly and must be pressed into lever until they contact shoulder.

Before reassembly, liberally smear bushes and fulcrum pin with recommended grease.

When installing lever, position rubber washers between ends of lever and actuator support.

153c BELL CRANK LEVER

The bell crank lever pivots on a pin (3) supported by two brackets attached to the axle housing. A rubber seal (1) is interposed between the lever and the upper support bracket and a thrust washer (4) between the lever and the lower bracket. The lever bushes (2) are of the sintered bronze type and a bearing (5) is located in the lower bracket.

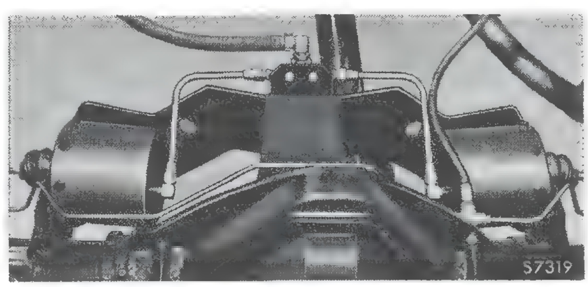


154 PARKING BRAKE CONTROL VALVE

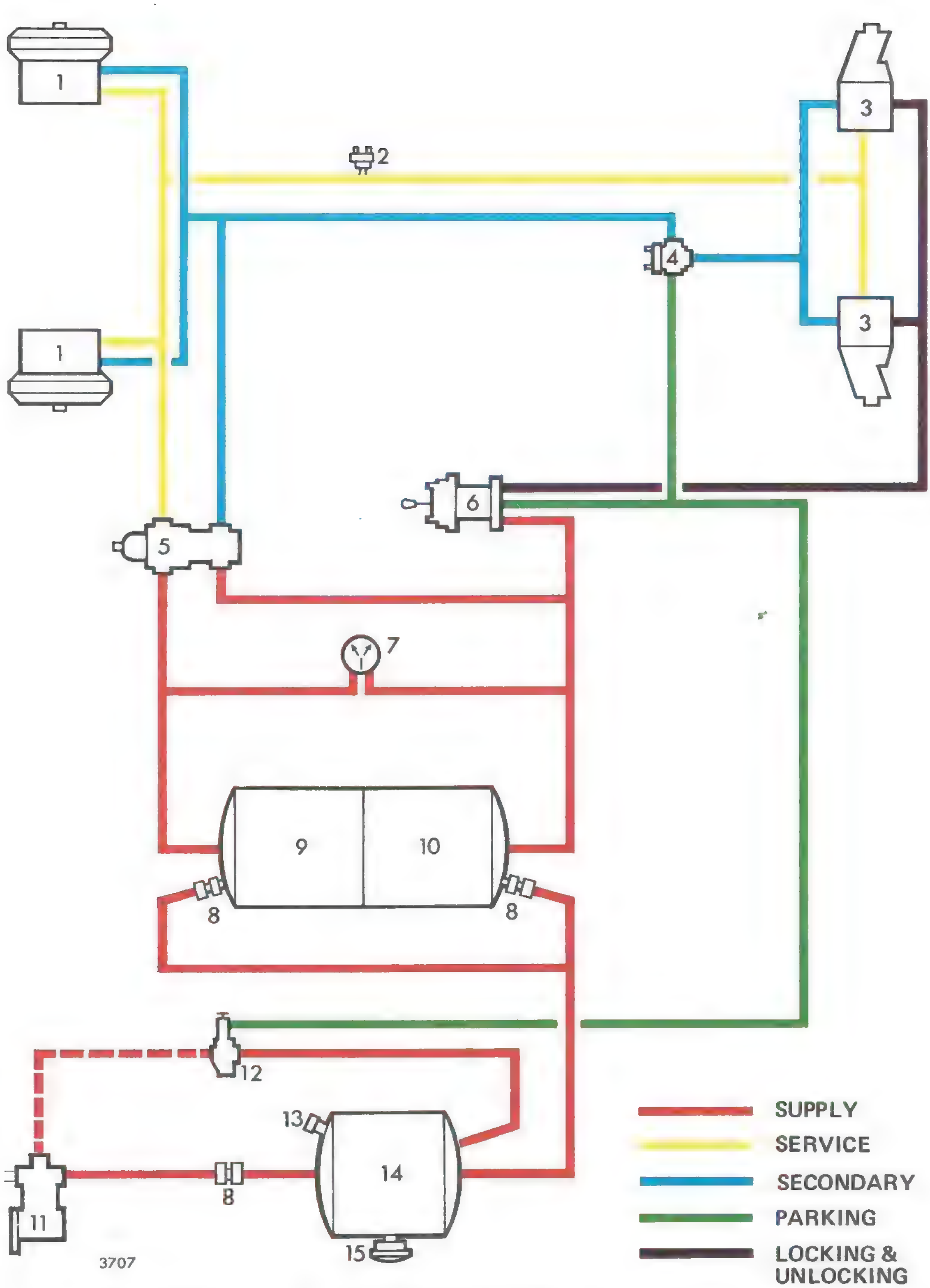
Refer to Sections 87 and 88.

155 SPRING BRAKE ACTUATOR

The spring brake actuator is similar to that described in Sections 89 and 90 except that two actuators mounted on a support attached to the rear axle housing are used on Model ERT. The actuators are connected directly to the brake cylinders.



DUAL AIR OPERATED SYSTEM



1. Front brake actuator
2. Stop lamp switch
3. Rear brake actuator
4. Change-over valve & stop lamp switch
5. Footbrake valve
6. Parking brake control valve
7. Dual air pressure gauge
8. Non-return valve
9. Service reservoir
10. Secondary reservoir
11. Compressor
12. Governor valve
13. Safety valve
14. Condensing reservoir
15. Automatic drain valve

Schematic diagram of braking system

The air pressure brake system, operated by the footbrake pedal, applies the brakes by means of piston/diaphragm actuators on the front brakes and dual piston lever lock actuators on the rear brakes. The service and secondary air pressures delivered by the footbrake valve are not equal and the actuators respond to the greater of the two pressures. In the event of failure of the service system the secondary system remains operational without loss of braking power.

A parking brake control valve operates the brakes on the rear wheels by means of the actuators which incorporate air pressure controlled lock mechanisms for holding the brakes on. Provision is made in the condensing reservoir for the attachment of an independent air supply should it become necessary to move the vehicle while the engine is inoperative.

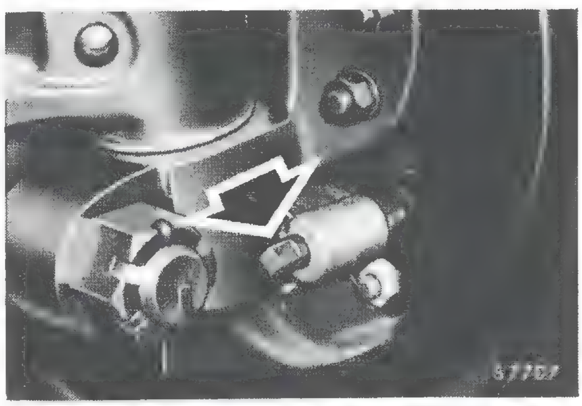
A dual air pressure gauge in the instrument panel indicates the service and secondary reservoir pressures.

The front and rear brakes are of the two-leading-shoe type operated by wedge and roller expanders.

156 BRAKE ADJUSTMENT

Before adjusting the brakes, check and if necessary, adjust the hub bearings. Check also for excessive wear of the shoe facings. These can be examined through the inspection holes in each flange plate.

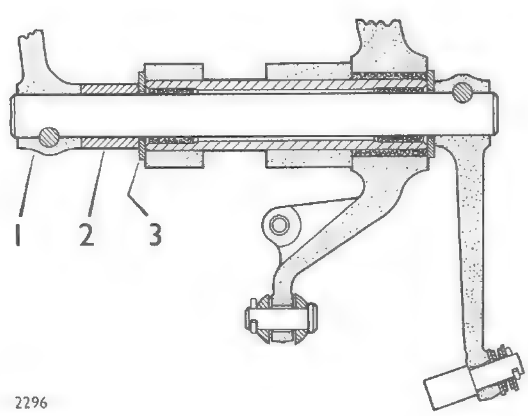
To adjust brakes, turn adjuster on each flange plate clockwise until shoes are hard against drum, then back off adjuster until shoes are just clear of drum.



157 BRAKE PEDAL AND LINKAGE

The brake pedal and linkage is similar to that described in Section 20 except that the relay lever pivots on a non-metallic bush and is connected, by a short push rod, to the footbrake valve.

On left drive models a spacer (2) is installed between washer (3) and clutch pedal (1).

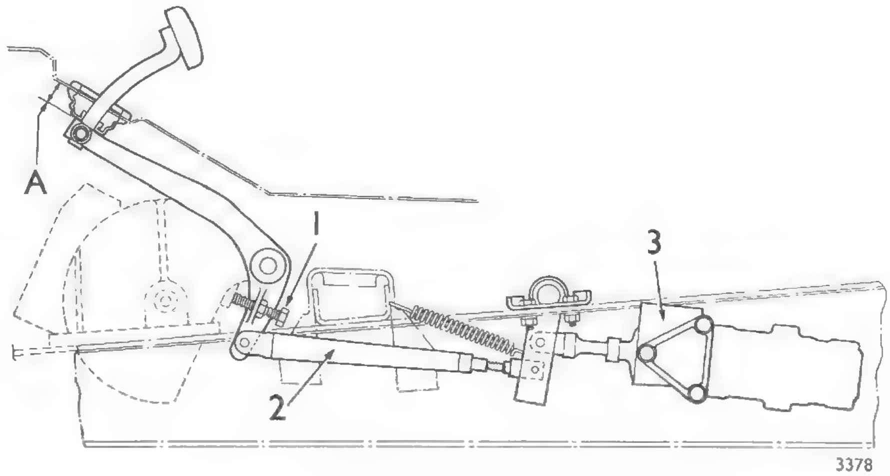


The pedal side clearance is not adjustable.

157a BRAKE PEDAL SETTING

It is not usually necessary to alter the brake pedal setting unless the stop bolt has been disturbed or parts of the linkage renewed.

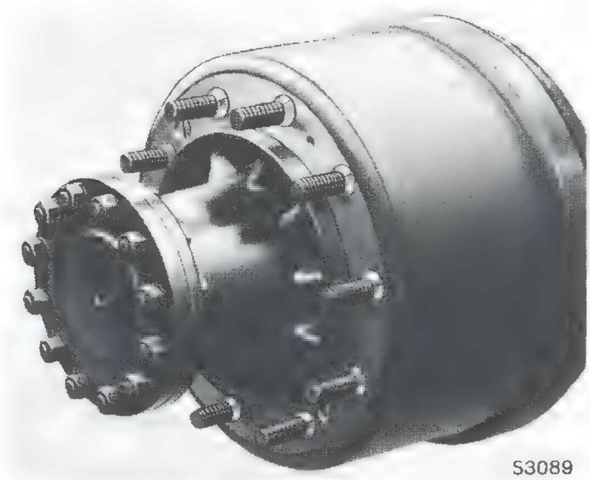
Pedal may be re-set by adjusting pedal stop bolt (1) until dimension 'A' between pedal lever and underside of toe panel is 1.00 in. With pedal held against stop and foot-brake valve (3) in off position adjust length of brake pedal push rod (2) until all free play is just eliminated.



After installing push rod clevis pin, back off pedal stop bolt half a turn to provide pedal free travel.

158 BRAKE DRUMS

The brake drums locate on the wheel bolts and are attached to the outside of the hubs by countersunk screws. Loose split cones on the wheel bolts locate the wheels.

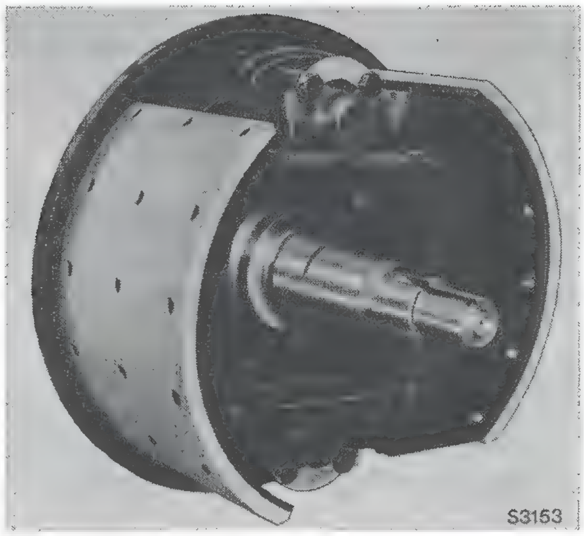


Hubs and drums should be removed and installed as assemblies as described in Training Manuals TS 1085 and TS 1086.

When assembling a new drum to hub, ensure mating surfaces are clean and free from damage.

159 BRAKE SHOES

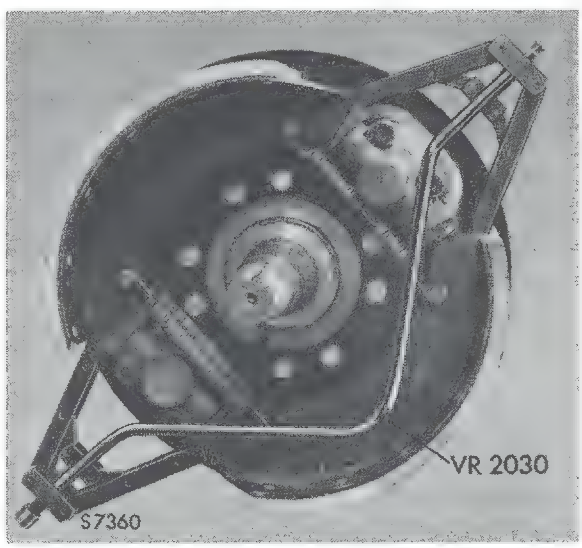
The front and rear brakes are of the Girling two-leading-shoe type with fabricated, twin-web shoes and facings secured by rivets. The shoes are held in contact with the expander and adjuster by four pull-off springs attached to the ends of the bell crank lever pivot pins.



When the brakes are applied the shoe expander plungers transmit movement to the brake shoes through bell crank levers and a strut so that even pressure of the facing against the drum is obtained.

Rotation of the drum in either direction causes the shoes to move on the inclined faces of the expander and adjuster plungers which provides the two-leading-shoe action.

Removal of shoes is facilitated by use of Expanders VR2030.



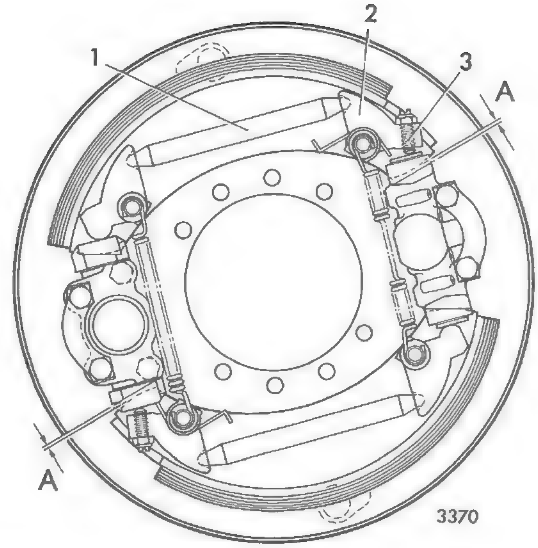
Bell crank lever pivot pins and struts are retained by spring clips.

On reassembly, smear inclined faces of expander and adjuster, bell crank lever and pins with recommended lubricant.

Bell crank lever (2) with adjusting screw (3) must be assembled to end of shoe with access hole. On front brakes, only the rear shoe incorporates bell crank levers and strut (1).

When installing shoes position double coil pull-off springs adjacent to expander and ensure leading and trailing ends of shoes are disposed as shown.

After installing shoes, ensure expander and adjuster plungers are in off positions, and adjust bell crank lever screws so that clearance 'A' between shoe web and abutment is 0.006/ 0.014 in.

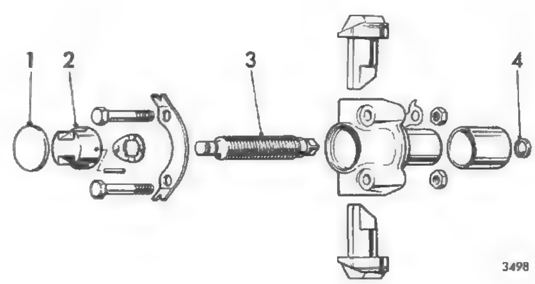


160 BRAKE ADJUSTERS

Brake adjusters may be disassembled without removal from flange plate after shoes are withdrawn.

Adjuster stem (3) may be screwed through housing after removal of plungers, housing cap (1) and circlip (4) retaining dust cover.

Wedge (2) is pinned to adjuster stem.



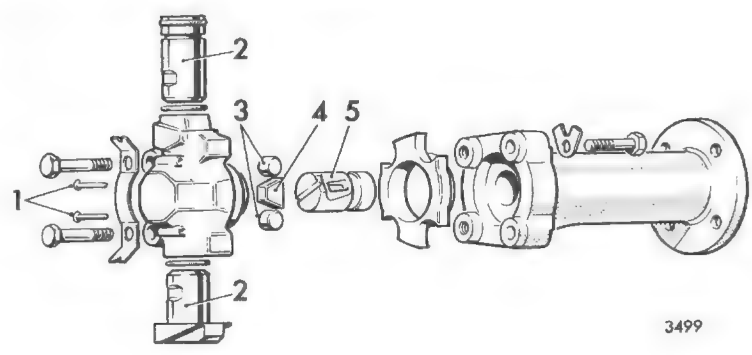
Renew components which show signs of wear or deterioration and lubricate all parts with recommended grease.

If adjuster has been detached from flange plate, assembly must be centralized after installing shoes and drum. This may be achieved by repeatedly adjusting shoes into contact with drum and striking circumference of drum with a soft faced hammer before finally tightening adjuster retaining bolts.

161 BRAKE EXPANDERS

Expander may be withdrawn after removal of brake shoes and bolts securing expander and actuator support.

Plungers (2), wedge (4), link (5) and rollers (3) may be withdrawn after removal of rivets (1) and expander housing.



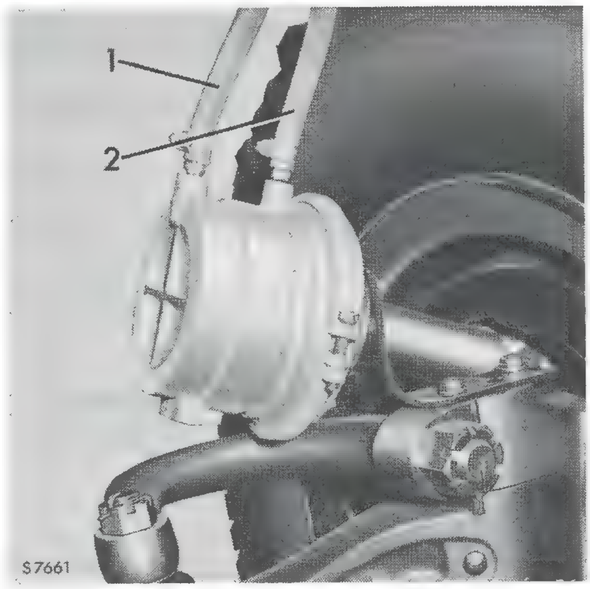
Renew components which show signs of wear or deterioration and lubricate all parts with recommended grease.

When assembling front brake expander, install headed plunger in bore away from abutment end of housing.

After installing shoes and drum, expander must be centralized by repeatedly adjusting shoes into contact with drum and striking circumference of drum with a soft faced hammer before finally tightening expander retaining bolts.

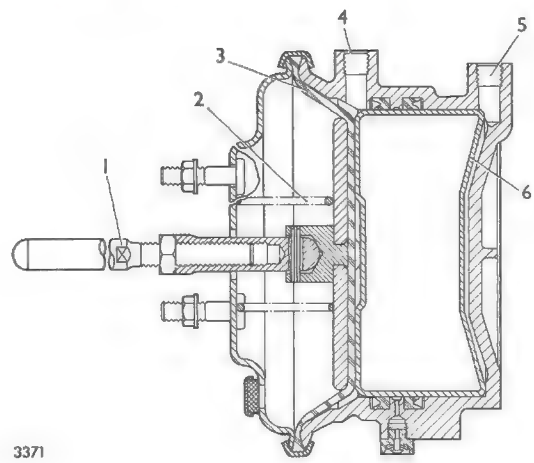
162 FRONT BRAKE ACTUATORS

The front brake actuators are of the 'pusher' type mounted on a support attached to the outside of the brake flange plates. An adjustable push rod extending through the actuator cover contacts the brake expander. Service (1) and secondary (2) air line ports are provided in the body.



When the footbrake is applied air enters the service line port (5) behind the piston (6) which, together with the diaphragm (3) and push rod (1), moves against the return spring (2) and applies the brakes.

In the event of failure of the service system, air from the secondary system, already present between the piston and the diaphragm, moves the diaphragm and push rod to apply the brakes while the piston remains stationary. The secondary line port (4) is nearer the push rod end of the actuator.



162a FRONT BRAKE ACTUATORS – Leakage Test

Actuators may be checked for leakage by fully charging air system and, with footbrake applied, smearing soap solution over vent in actuator cover and body.

Leakage from vent in body indicates failure of one or both piston seals.

Leakage from vent in cover indicates a faulty diaphragm.

162b FRONT BRAKE ACTUATORS – Removal and Disassembly

Before disconnecting hoses, identify hoses in relation to actuator ports to ensure correct installation. Service port is nearest chassis sidemember.

Before removing clamp, mark position of body in relation to cover. Spring tension may be overcome by hand pressure.

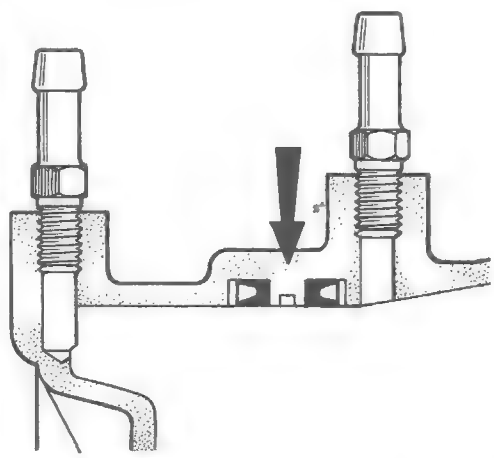
Piston may be removed from body by applying low air pressure to service port.

Discard all components which will be renewed from a repair kit.

162c FRONT BRAKE ACTUATORS – Reassembly and Installation

Before reassembly, smear all sliding surfaces and seals with recommended grease.

When installing piston seals in body, ensure open sides of seals face away from each other.

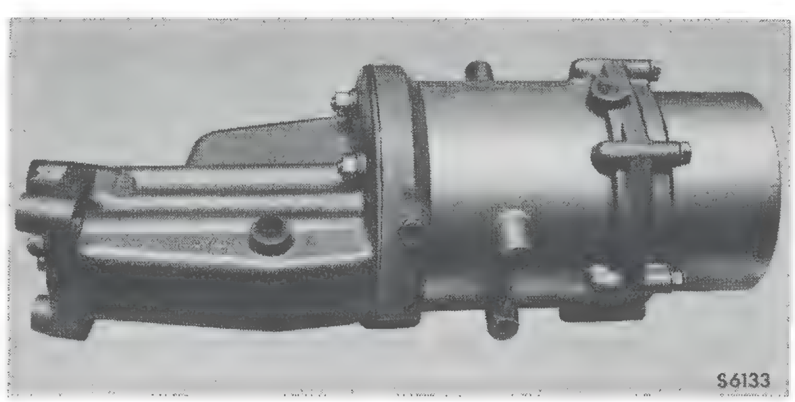


3515

When installing actuator, locate gasket on actuator support, and adjust length of push rod so that actuator cover just contacts gasket. Screw push rod on to actuator rod a further half turn, to provide clearance between push rod and expander, before tightening locknut.

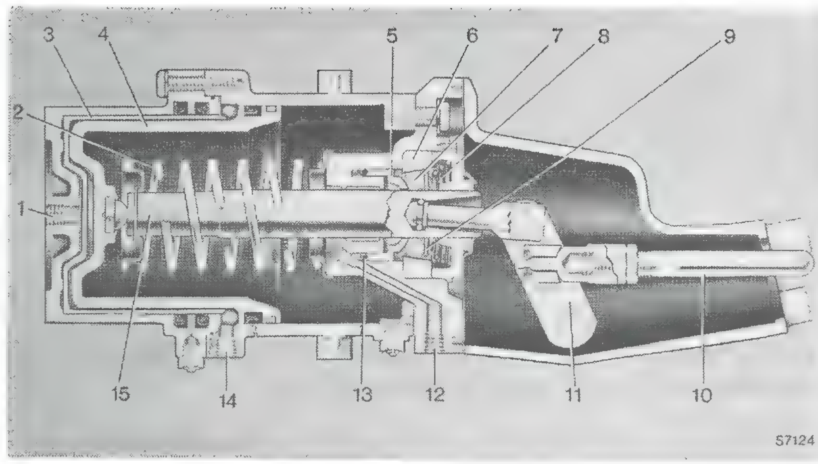
163 REAR BRAKE ACTUATORS

The rear brake actuators are of the double-piston lever-type with air pressure controlled spring-operated locks for parking. Each actuator is mounted on the outside of the brake flange plate and operates the expander by means of an adjustable push rod connected by levers to the piston shaft.



S6133

When the footbrake is applied air enters the service line port (1) behind the piston (3) which, together with the piston (4) and piston shaft (15), moves against the return spring (2) to apply the brakes by means of the levers (11) and push rod (10).



In the event of failure of the service system, air from the secondary system, already present between the pistons, moves the secondary piston (4) and shaft to apply the brakes, while the service piston (3) remains stationary. The secondary line port (14) is incorporated in the actuator body.

The locking device operates on the piston shaft and consists of eight barrel shaped rollers (7) in a lock collar (6), the bore of which is tapered.

Under normal application of the brake pedal, the lock mechanism is held in the off position by air pressure entering the lock port (12) in the actuator body. This air pressure, controlled by the parking brake control valve, acts on the lock piston sealing ring (13) to push the lock piston (5) against the spring loaded rollers which move into the larger diameter of the lock collar. This allows free movement of the piston shaft when applying or releasing the brakes.

When the parking brake is applied, air pressure from the parking brake control valve enters the secondary line port to apply the brakes and the air pressure to the lock port is exhausted. The spring (8) and thrust washer (9) push the rollers towards the smaller diameter of the lock collar to grip the piston shaft as it attempts to return to the off position. The brakes are thus held on mechanically with no air pressure in the actuators.

163a REAR BRAKE ACTUATORS – Leakage Test

Actuator may be checked for leakage by fully charging air system and, with footbrake applied, smearing vent in end cover with soap solution. Leakage in excess of a one inch bubble in five seconds indicates a defective service piston rear seal, located nearer closed end of end cover.

With footbrake released and parking brake control lever in 'AUX & UNLOCK' position, again check for leakage from vent in end cover. Leakage in excess of a one inch soap bubble in five seconds indicates a defective service piston front seal, located nearer open end of end cover.

With parking brake control lever in 'AUX & UNLOCK' position, seal vent in lock body with tape and apply soap solution to drain valve in cylinder. Leakage in excess of a one inch soap bubble in five seconds indicates a defective secondary piston seal.

Leakage is not permitted from any joints or pipe connections.

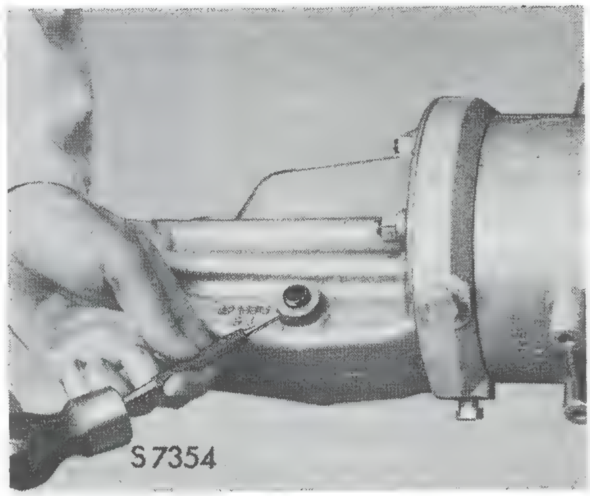
163b REAR BRAKE ACTUATORS – Removal and Disassembly

Removal of actuator entails removal of hub and brake drum for access to retaining bolts.

Before disassembly mark all joints along actuator to ensure correct reassembly.

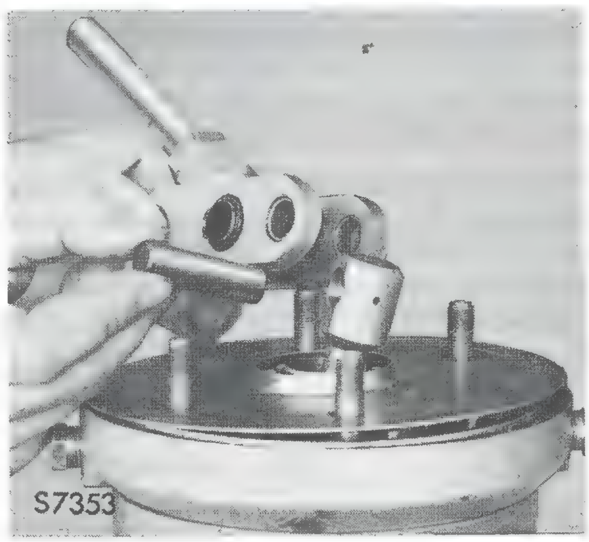
A sharp pull on end of push rod will release rod from retaining disc in lever swivel block.

Before removing lever housing, lever pivot pin must be withdrawn. Pin, which is retained by a spring pin in housing boss, must be driven out through spring pin side of housing. It is necessary to cut spring pin to facilitate complete removal.



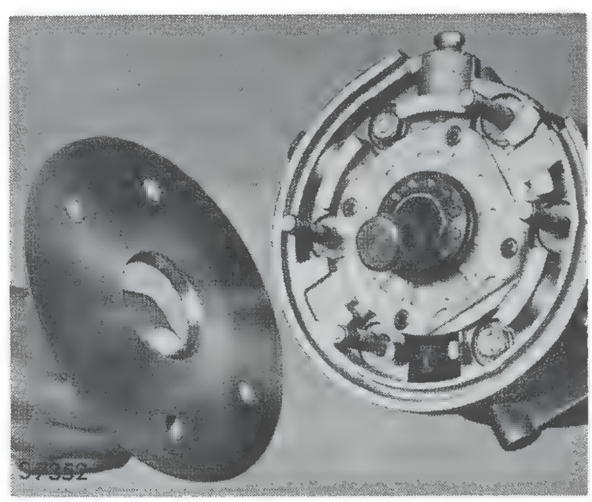
When lever housing is removed a spacer will be displaced from inside pivot pin boss.

Levers may be separated from connecting rod by removing pivot pin. Pin is retained by a spring pin. No attempt should be made to separate connecting rod from piston shaft.



If necessary, lever assembly may be disassembled by removing circlips. Push rod friction disc in swivel block is retained by a circlip.

Access to lock mechanism retaining cap is gained by removing dust shield. Spring tension on cap may be overcome by hand pressure.



When removing bolts securing lock body care must be taken to restrain spring pressure.

Pistons may be withdrawn after removing end cover.

163c REAR BRAKE ACTUATORS – Inspection and Reconditioning

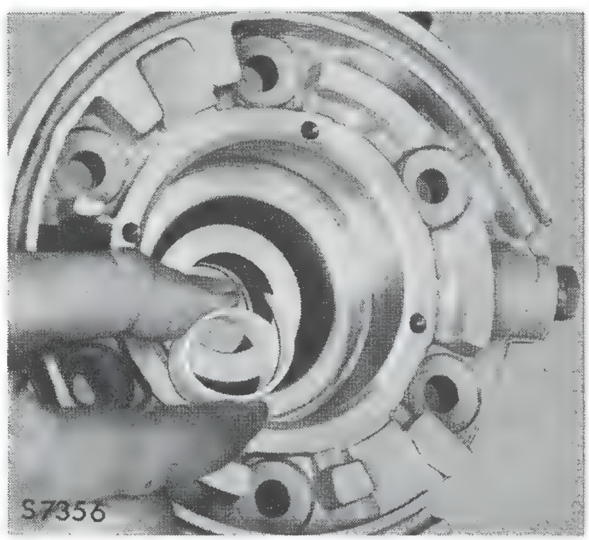
Discard all components which will be renewed from a repair kit.

Remove all traces of sealant from flanges and inspect lever bushes and pivot pins for excessive wear.

Check lock collar for signs of indentation and piston shaft for plating defects.

Ensure vents in end cover and cylinder are not obstructed.

Bush in lock body may be extracted by curling ends together.



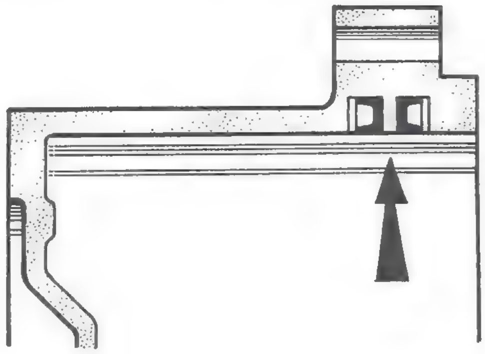
163d REAR BRAKE ACTUATORS – Reassembly

Before reassembly, liberally smear all load bearing and sliding surfaces including seals with recommended grease. Area between rollers in lock mechanism must be packed with grease.

A new secondary piston lubricator wick must be soaked for 30 minutes in recommended oil.

Assemble seals in end cover so that open sides face away from each other.

Open side of wider secondary piston seal faces towards closed end of piston.



3520

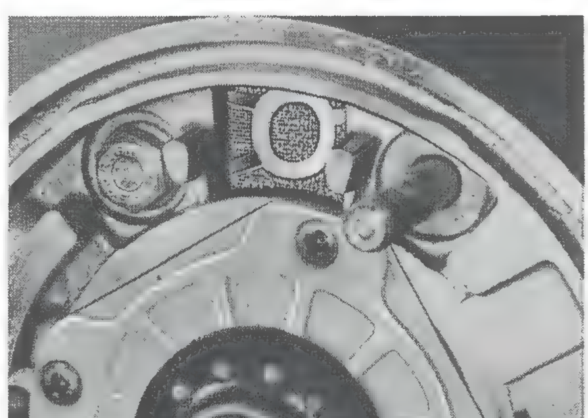
Tighten lock body retaining bolts to specified torque.

With pistons installed in end cover, place piston shaft and spring inside secondary piston and assemble actuator body. Care must be taken to avoid damage to sealing ring on end cover.

Tighten end cover bolts to specified torque.

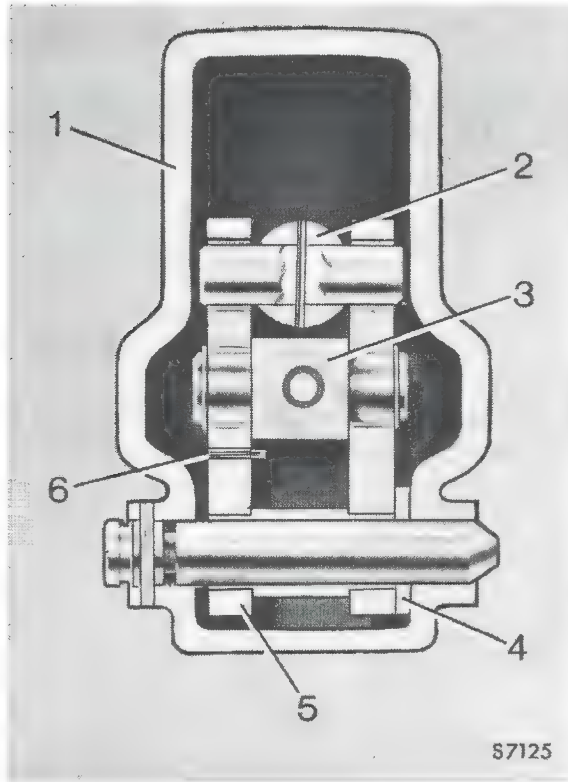
With lock mechanism temporarily assembled, restrain retaining cap with hand pressure and apply air pressure to lock port to align rollers. After fully tightening retaining cap screws ensure that piston shaft moves freely in both directions by applying air pressure alternately to lock port and port in end cover.

Before installing dust shield, ensure vent felt retainer is at least 0.06 in. below surface of lock body and liberally smear perimeter of dust shield and lock body with Bostik 772.



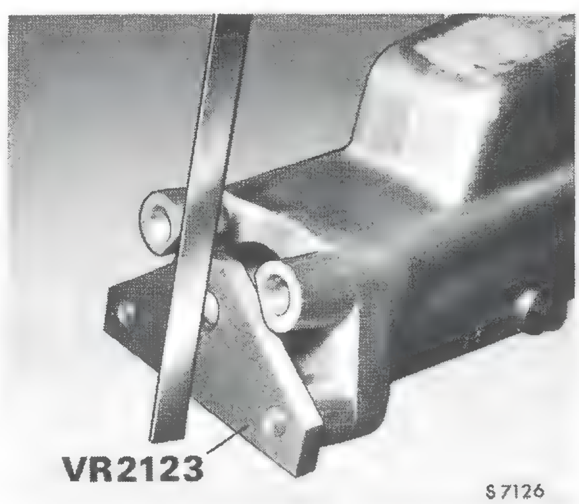
Assemble levers so that when attached to connecting rod (2), friction disc in swivel block (3) faces lock body and spring pin (6) in lever (5) is below swivel block.

When installing lever housing (1), attach spacer (4) with grease, to inside of boss without a spring pin hole. Tighten nuts to specified torque.



Seal bevelled end of lever pivot pin with Bostik 772 after installation.

Before installing actuator, length of push rod must be adjusted using Gauge VR2123. When pins of gauge are fully engaged in plain holes of lever housing, end of rod must be flush with surface of gauge. Rod may be removed with a sharp pull for adjustment and one turn of rod relative to rod attachment end will alter length by 0.055 in.



164 NON-RETURN VALVES

Non-return valves, identical to those described in Section 75, are incorporated in the service and secondary reservoir supply connections and in the air line between the compressor and the condensing reservoir. A non-return valve is not included in the air line to the parking brake control valve.

When installing line non-return valve, arrow on body must be in direction of condensing reservoir.

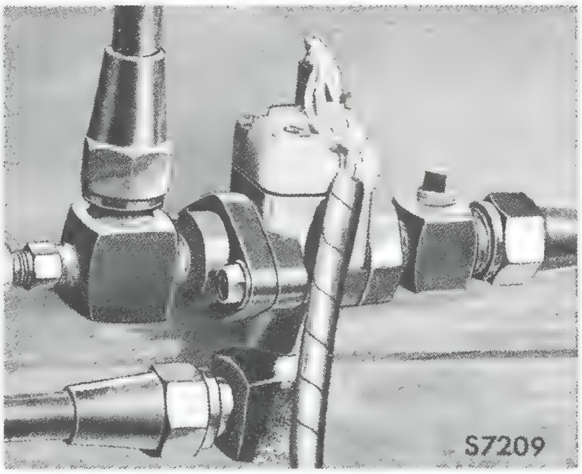
165 SAFETY VALVE

Information concerning the safety valve is contained in Section 105. Operating pressure of valve may be checked on dual air gauge by charging system with parking brake control lever held in 'AUX & UNLOCK' position.

166 STOP LAMP SWITCHES

A stop lamp switch similar to that described in Section 106 is incorporated in the service air line from the footbrake valve to the rear brake actuators.

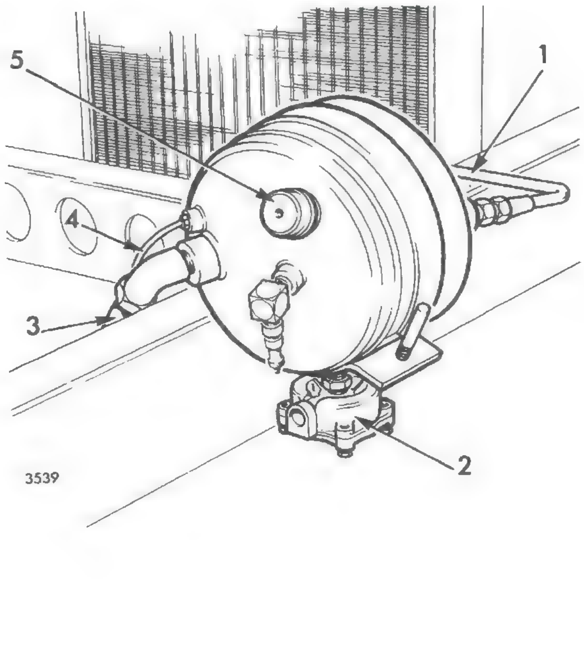
A second stop lamp switch is combined with the change-over valve in the secondary air line to the rear brake actuators.



167 CONDENSING RESERVOIR

A condensing reservoir, fed by air from the compressor via a non-return valve and air line (3), mounted on the chassis sidemember at the front of the vehicle to ensure maximum air cooling and condensation of water vapour.

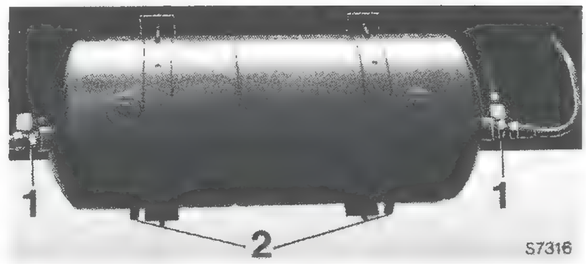
The reservoir is fitted with an automatic water drain valve (2) and a non-adjustable ball-type safety valve (5). Air lines (1 and 4) supply the dual air reservoir and compressor governor valve respectively.



168 DUAL AIR RESERVOIR

A dual reservoir comprising a service air reservoir and a secondary air reservoir combined in one assembly is mounted on the chassis frame. The reservoirs, which are fed with dry air from the condensing reservoir via non-return valves (1), supply air to the footbrake valve, and the secondary reservoir also supplies the parking brake control valve.

The reservoirs are provided with drain plugs (2).

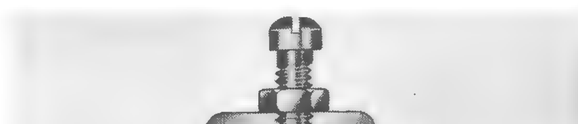


169 AUTOMATIC DRAIN VALVE

Refer to Section 110.

170 COMPRESSOR GOVERNOR VALVE

The compressor governor valve is similar to that described in Section 60 except that the top cover is sealed and provided with a tapped inlet port. A nylon pipe connects the port to the parking brake control valve delivery air line. When the parking brake control lever is in the 'AUX & UNLOCK' position, air pressure enters the governor valve cover and prevents the valve from cutting-out at the normal operating pressure. If necessary, the system may be charged to the safety valve operating pressure.



The governor valve cut-out pressure may be checked on the vehicle dual air pressure gauge.

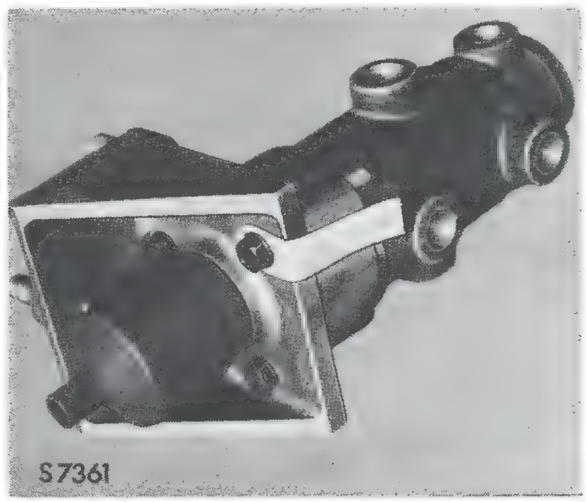
171 COMPRESSOR ANTI-FREEZER

Information concerning the compressor anti-freezer, which may be connected to the compressor intake, is contained in Section 258.

172 FOOTBRAKE VALVE

The footbrake valve is similar to that described in Section 114 except that the front piston return spring is weaker than the rear piston return spring. This differential maintains the service line air pressure to the actuators approximately 1.7 bar (25 lb/sq in.) more than the secondary line until maximum pedal pressure is reached, when the air pressure in both lines is the same.

The valve may be recognised by the type number APGA6376 stamped on the identification tag attached to the valve.



173 COMPRESSOR CYLINDER HEAD

Refer to Section 115.

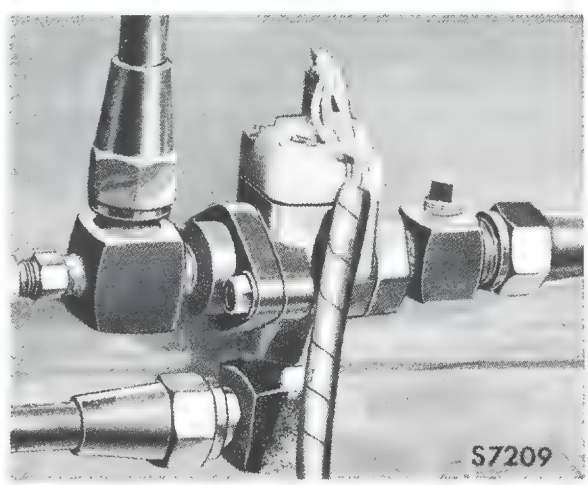
174 COMPRESSOR

Refer to Section 116.

175 CHANGE-OVER VALVE

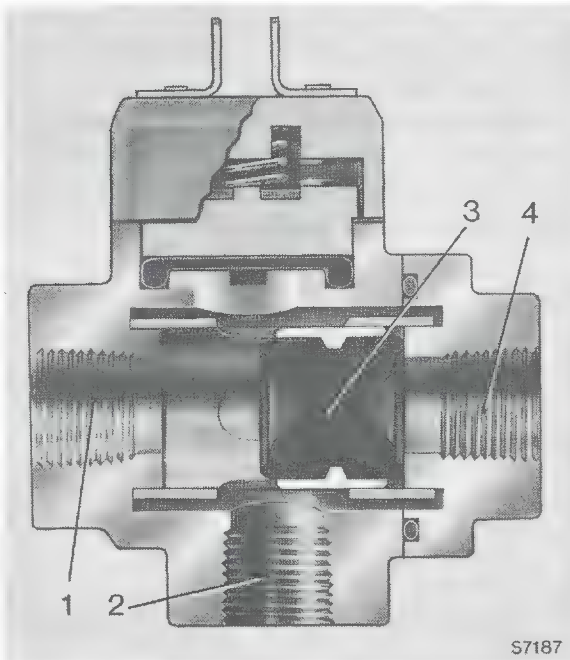
A change-over valve is incorporated in the system to prevent loss of air through the parking brake control valve when the foot-brake is applied. The valve also prevents application of the front brakes during parking.

A stop lamp switch is attached to the valve body.



The valve consists of a body which has two supply ports and one delivery port. The body contains a shuttle valve which is free to move along a guide.

When the parking brake control valve lever is moved towards the 'PARK' position, compressed air enters supply port (1) and moves the shuttle valve (3) to the opposite end to seal the other supply port. This allows air to pass through the delivery port (2) to the rear brake actuators and prevents leakage through supply port (4) to the front brake actuators.



175a CHANGE-OVER VALVE – Leakage Test

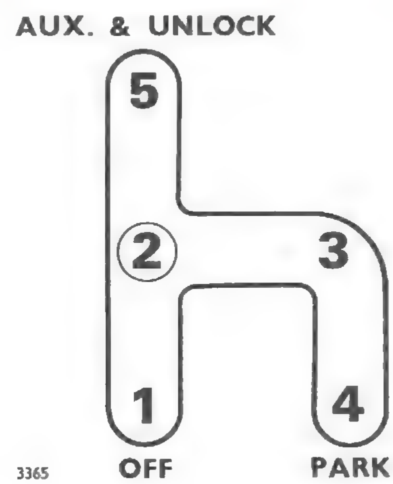
Leakage at parking brake control valve port of change-over valve may be detected by fully charging system and smearing exhaust aperture at rear of parking brake valve with soap solution. Leakage in excess of a ½ in. bubble in five seconds, with the parking brake valve in 'OFF' position and footbrake applied, indicates a faulty shuttle valve.

Leakage from footbrake valve side of change-over valve may be detected by fully charging system and smearing exhaust diaphragm at rear of footbrake valve with soap solution. Leakage in excess of a ½ in. bubble in five seconds, with parking brake valve in 'AUX & UNLOCK' position, indicates a faulty shuttle valve.

Change-over valve may be disassembled by removing cover.

Before reassembly, smear shuttle valve sleeve and inner surface of guide with recommended grease.

The parking brake control valve, mounted by the driver's seat, is supplied with air from the secondary reservoir. When the control valve lever is in the 'OFF' position the valve supplies reservoir pressure to the rear actuator locks to hold them disengaged.



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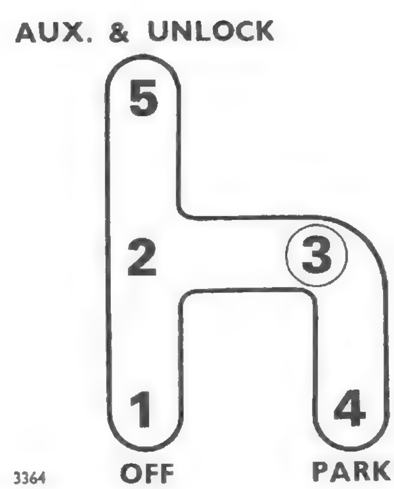
When the control lever is moved to position 2, air pressure at approximately 5 bar (70 lb/sq in.) is delivered to the rear brake actuator secondary pistons to apply the brakes. Air pressure is also delivered to the governor valve to render it inoperative.



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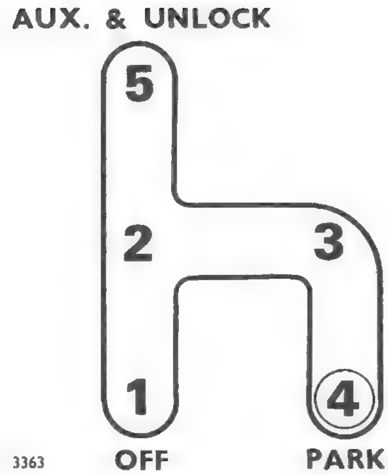
Movement of the lever to position 3 exhausts the air from the actuator locks permitting the springs to engage the locks. A hydraulic damper prevents rapid movement of lever from position 2 to position 3 which allows the pressure in the actuators to stabilize.

As the lever is moved to position 4 air pressure is exhausted from the actuators and the governor control line and the brakes are held on by the locks.



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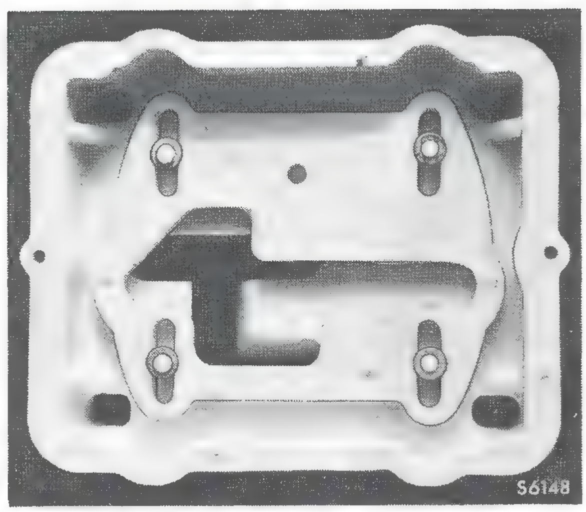
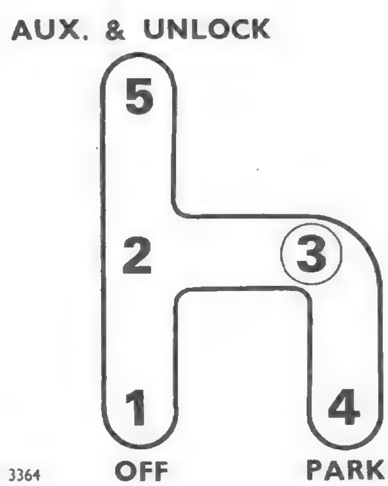
A sliding gate underneath the cover of the valve prevents movement of the control valve lever from 'PARK' directly to 'OFF' without engaging the 'AUX & UNLOCK' position when releasing the brakes.

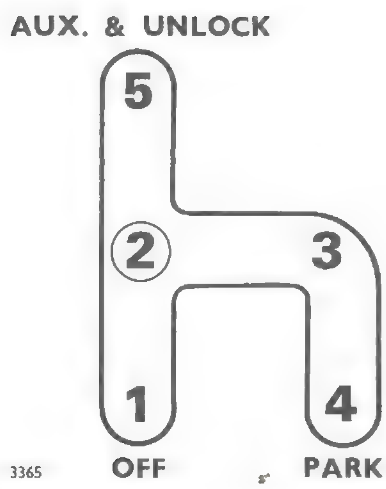


The correct sequence for releasing the parking brake commences with movement of the lever to position 3 which supplies air pressure, at approximately 5 bar (70 lb/sq in.) to the actuators to hold the brakes on, and to the governor valve to render it inoperative.



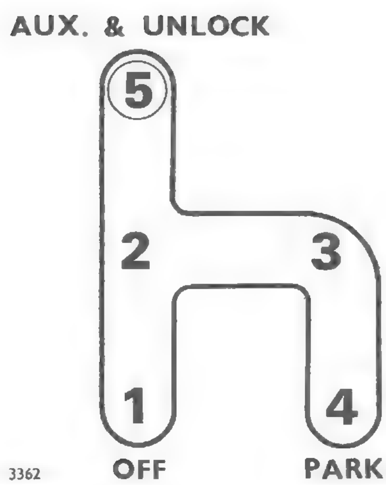
3364

Movement of the lever to position 2 supplies reservoir pressure to the actuator locks, which may not disengage.



3365

The lever must then be moved to position 5 to supply reservoir pressure to the actuators and permit disengagement of the locks. If the locks do not disengage, the lever must be held in position 5 while the reservoir pressures increase sufficiently, if necessary to the safety valve operating pressure, to release the locks.



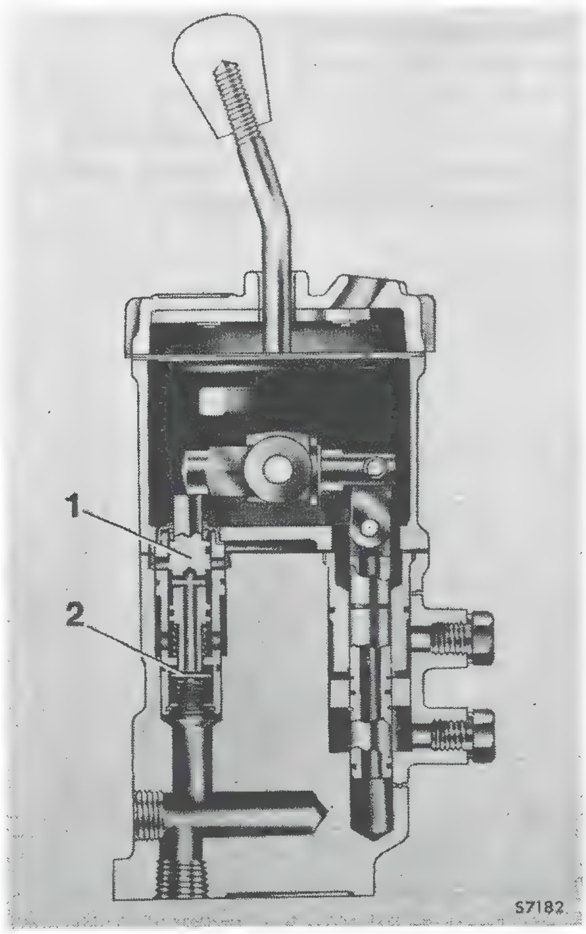
3362

When the lever is moved to position 1, air is exhausted from the actuators, and the governor control line, to release the brakes and allow normal operation of the governor valve.

The degree of brake application provided by the valve when the lever is moved towards the 'AUX & UNLOCK' position is proportional to the effort applied to the lever.

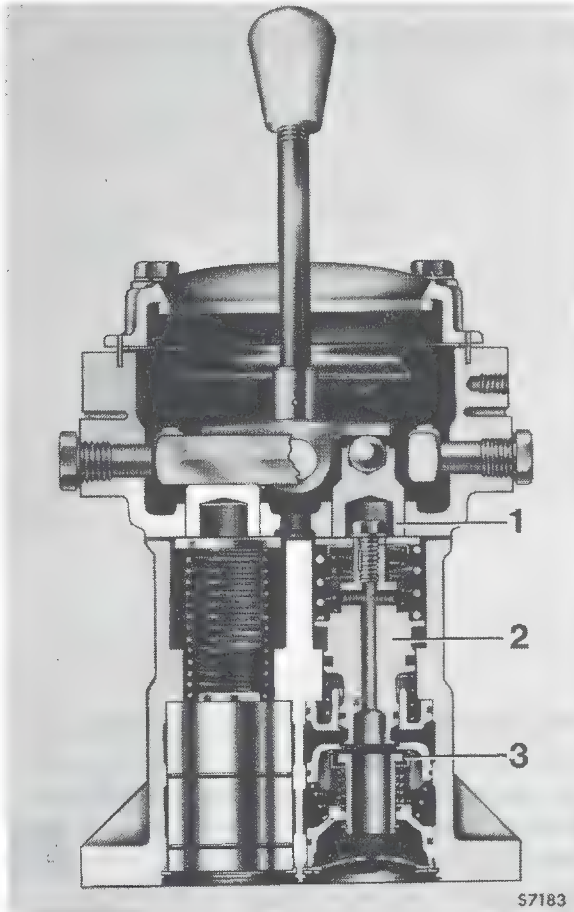
The valve consists of a body, lever housing and cover. The body has two large bores, one incorporating a spring-loaded valve assembly and the other a spring and blanking plug. Two small bores in the body incorporate the hydraulic damper and a valve which controls the air supplied to the actuator locks.

When the lock control valve is depressed, the seat on the plunger (1) contacts the disc valve (2), closing the exhaust passage through the plunger. The plunger then moves the disc away from the inlet seat and air from the reservoir passes to the actuator locks.

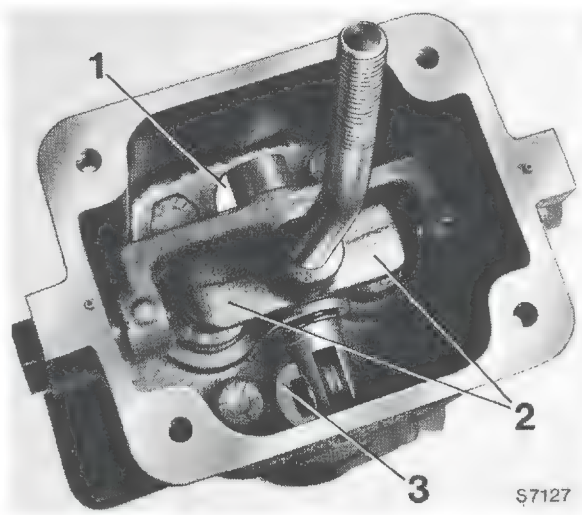


The larger spring-loaded valve assembly controls the air supplied to the actuators, the proportion of air delivered being controlled by the pressure exerted on the springs in the valve in response to movement of the control valve lever.

When the plunger and ball assembly (1) is depressed, the piston (2) moves down the bore until the exhaust seat closes against the inlet/ exhaust valve (3). The valve is then moved off its seat and air from the reservoir passes to the actuators to apply the brakes



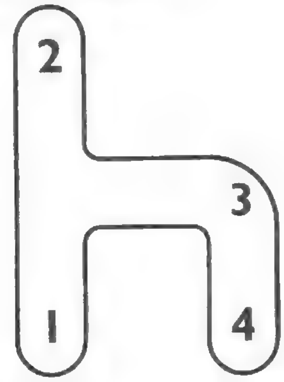
The control valve lever is provided with two lugs (2) which operate the plungers in the two large bores in the valve body. A cross-shaft at the base of the lever is connected to the hydraulic damper (3) and also operates the lock control valve (1).



176a PARKING BRAKE CONTROL VALVE – Operating Test

To check operation of valve, install air pressure gauges in air line to actuator locks and air line to actuator secondary port.

With lever in appropriate position and system charged to governor valve cut-out pressure, the following readings should be recorded on test gauges:



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Lever Position	Pressure at Lock Ports	Pressure at Secondary Ports
1	As secondary reservoir	Zero
2	As secondary reservoir	As secondary reservoir
3	Zero	As gate setting — approx. 5 bar (70 lb/sq in.)
4	Zero	Zero

Recharge system and move lever to several positions between 1 and 2, checking that gauge in line to secondary ports prompty registers a variation in pressure in proportion to lever movement. When lever is held stationary between positions 1 and 2 gauge should stabilize quickly and in proportion to lever position.

Move lever to 'PARK' position before removing gauges.

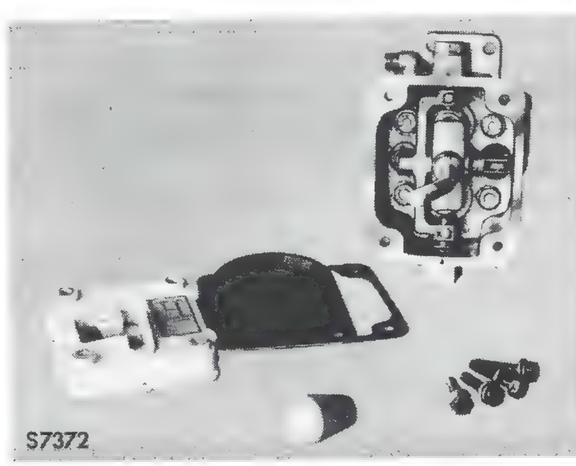
176b PARKING BRAKE CONTROL VALVE — Removal and Disassembly

Before removing valve, mark each pipe relative to valve and also position of valve relative to its mounting.

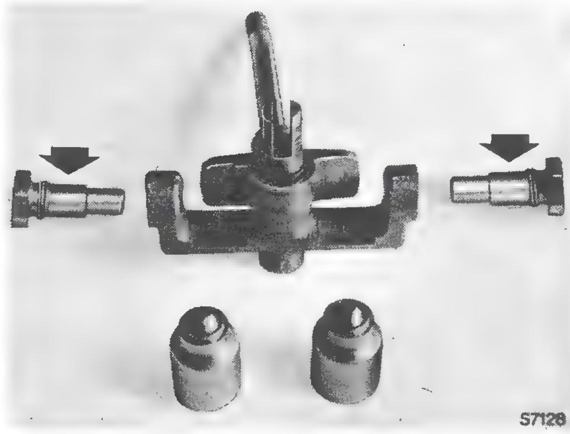
Mark relative positions of cover, lever housing and body before disassembly.

Hydraulic damper and lock control valve may be withdrawn after removal of lever housing.

Access to lever housing retaining bolts is gained by unscrewing lever knob and removing cover and gaiter.


S7372

Lever assembly may be withdrawn after removing pivot bolts, and circlip and pin from damper.



Disc valve, spring and washer may be withdrawn from lock control valve sleeve after removing circlip.

Before removing circlips retaining blanking plug and valve assembly from base of valve, mark body adjacent to bore containing blanking plug, and drain damper oil.

Guide, seal retainer, spring and valve support may be separated from inlet/exhaust valve after removing circlip.

If required, graduating springs may be separated from piston after removing retaining bolt.

176c PARKING BRAKE CONTROL VALVE – Inspection

Discard all components which will be renewed from a repair kit.

Examine all components for wear, scores and corrosion including valve seats and springs.

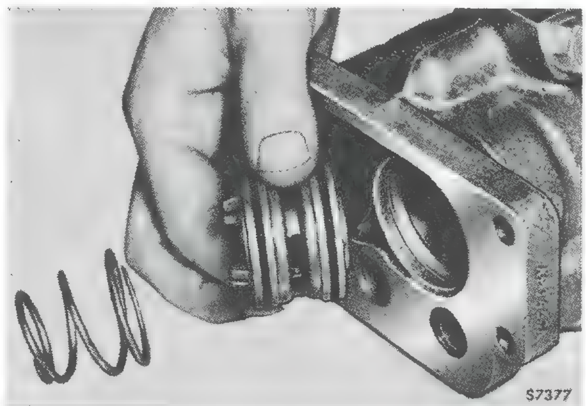
Check operation of sliding gate and inspect lever mechanism for wear.

176d PARKING BRAKE CONTROL VALVE – Reassembly

Before reassembly smear all sliding and load bearing surfaces, including seals, with recommended grease.

When assembling guide to inlet/exhaust valve, ensure valve spring locates in groove in seal retainer.

After installing inlet seat, spigoted end first into bore, insert retaining spring with smaller diameter coils towards valve guide.



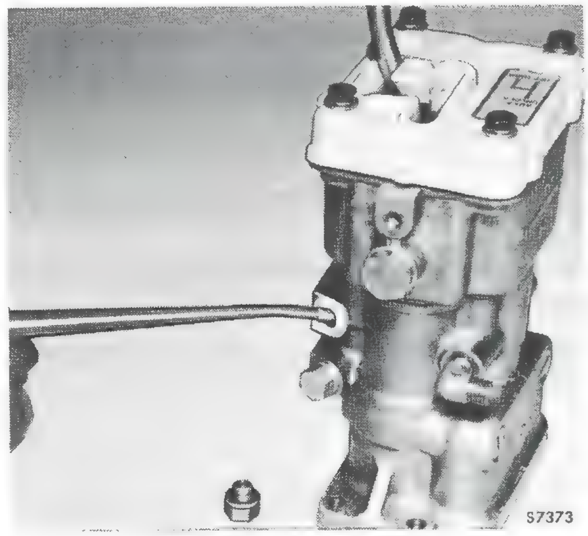
After installing piston return spring, insert piston and spring assembly into lever end of bore.

When installing disc valve in lock control valve sleeve, ensure recessed side of disc faces towards circlip.

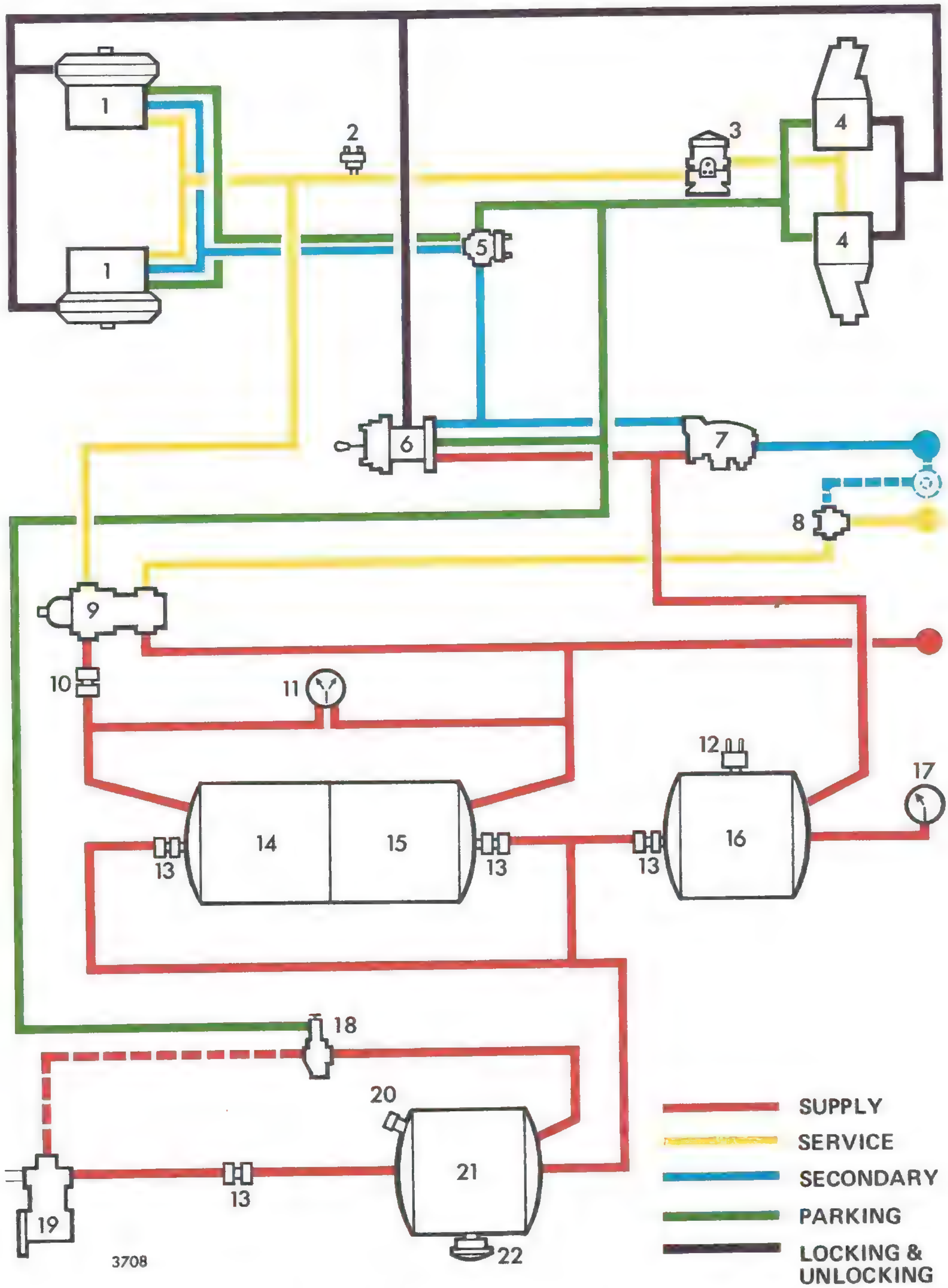
Install plunger in sleeve so that hollow end of plunger contacts disc valve.

Tighten cover retaining bolts to specified torque.

Before installing valve, hydraulic damper must be filled with recommended oil. With lever in 'PARK' position, fill damper to level of upper plug, install plug and move lever across gate several times. With lever in 'PARK' position, again remove upper plug and top up damper. Repeat this operation until no drop in oil level occurs.



DUAL AIR OPERATED TRACTOR SYSTEM WITH THREE-LINE TRAILER BRAKING



1. Front brake actuator
2. Stop lamp switch
3. Load sensing valve
4. Rear brake actuator
5. Change-over valve & stop lamp switch
6. Secondary/parking brake control valve
7. Secondary relay valve
8. Change-over valve
9. Footbrake valve
10. Biased non-return valve
11. Dual air pressure gauge
12. Low pressure warning switch
13. Non-return valve
14. Tractor service reservoir
15. Trailer service reservoir
16. Secondary reservoir
17. Air pressure gauge
18. Governor valve
19. Compressor
20. Safety valve
21. Condensing reservoir
22. Automatic drain valve

Schematic diagram of braking system

The air pressure brake system, operated by the footbrake valve, applies the tractor front brakes by means of piston/diaphragm lock actuators and the rear brakes by means of dual piston lever lock actuators. The footbrake valve also controls the trailer service air line which is provided with a yellow flexible connecting hose.

The trailer emergency air line, fed from the trailer service reservoir on the tractor, has a red flexible connecting hose and performs two functions. (a) It supplies air to the trailer reservoir, and (b), in conjunction with a relay and inverted relay valve mounted on the trailer, provides a means of automatically applying the trailer brakes should the emergency line fail as in the event of trailer break-away.

Also provided on the flexible hose support is a coupling head to which the secondary line flexible hose should be connected when a trailer having a two-line braking system is used with the vehicle. This enables the tractor secondary system to operate through the service line coupling via a change-over valve.

A secondary/parking brake control valve operates the front brakes on the tractor and also controls the trailer secondary air line which is provided with a blue flexible connecting hose.

The brakes on the front and rear wheels of the tractor may be held on for parking by means of a lock mechanism in the actuators which are controlled by air pressure from the secondary/parking brake control valve. Provision is made in the condensing reservoir for the attachment of an independent air supply should it become necessary to move the vehicle while the engine is inoperative.

A dual air pressure gauge in the instrument panel indicates the tractor service and trailer service reservoir pressures. A separate gauge indicates the secondary reservoir pressure. The tractor service gauge registers a pressure approximately 1.5 bar (20 lb/sq in.) less than the other gauges under normal operating conditions due to the presence of a biased non-return valve in the service system.

The front and rear brakes are of the Girling two leading shoe type operated by wedge and roller expanders.

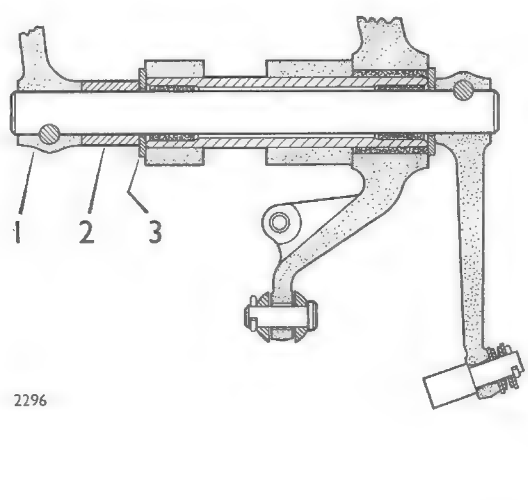
177 BRAKE ADJUSTMENT

Refer to Section 156.

178 BRAKE PEDAL AND LINKAGE

The brake pedal and linkage is similar to that described in Section 20 except that the relay lever pivots on a non-metallic bush and is connected, by a short push rod, to the footbrake valve.

On left drive models a spacer (2) is installed between washer (3) and clutch pedal (1).



The pedal side clearance is not adjustable.

178a BRAKE PEDAL SETTING

Refer to Section 157a.

179 BRAKE DRUMS

Information concerning the brake drums is contained in Section 158. Release parking brake before removing front hub and brake drums.

180 BRAKE SHOES

Refer to Section 159.

181 BRAKE ADJUSTERS

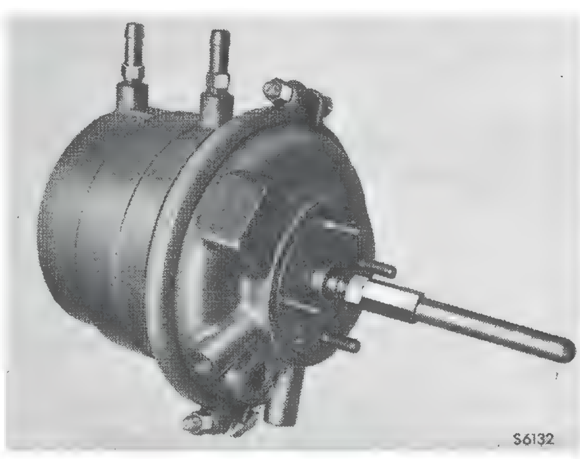
Refer to Section 160.

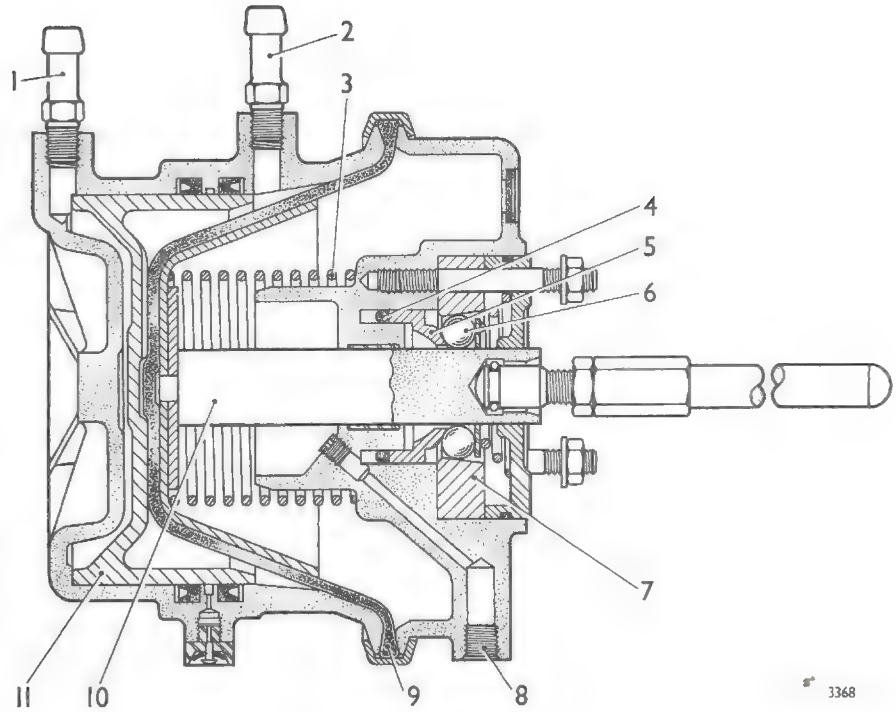
182 BRAKE EXPANDERS

Refer to Section 161.

183 FRONT BRAKE ACTUATORS

The front brake actuators are of the 'pusher' type, mounted on a support attached to the outside of the brake flange plates. An adjustable push rod extending through the actuator cover contacts the brake expander. Service and secondary/park air line ports are provided in the body and a lock air line port in the cover.





When the footbrake is applied air enters the service line port (1) behind the piston (11) which, together with the diaphragm (9) and push shaft (10), moves against the return spring (3) and applies the brakes.

In the event of failure of the service system, operation of the secondary/parking brake control valve introduces air through the secondary port (2) between the piston and the diaphragm. The piston remains stationary and the diaphragm and push shaft move to apply the brakes.

The locking device operates on the push shaft and consists of eight barrel shaped rollers (6) in a lock collar (7), the bore of which is tapered.

Under normal application of the footbrake, the lock mechanism is held in the off position by air pressure entering the lock port (8). This air pressure, controlled by the secondary/parking brake control valve, acts on the lock piston sealing ring (4) to push the lock piston (5) against the spring loaded rollers which move into the larger diameter of the lock collar. This allows free movement of the push shaft when applying or releasing the brakes.

When the parking brake is applied, air pressure from the secondary/parking brake control valve enters the secondary/park port to apply the brakes and the air pressure to the lock port is exhausted. The spring and thrust washer push the rollers towards the smaller diameter of the lock collar to grip the push shaft as it attempts to return to the off position. The brakes are thus held on mechanically with no air pressure in the actuators.

183a FRONT BRAKE ACTUATORS — Leakage Test

Actuator may be checked for leakage by fully charging air system and, with footbrake applied, smearing soap solution over vent in actuator body. Leakage indicates failure of piston rear seal.

With secondary/parking brake control valve lever in the 'UNLOCK' position smear soap solution over vent in actuator body and cover.

Leakage from vent in body indicates failure of piston front seal and leakage from vent in cover indicates a faulty diaphragm.

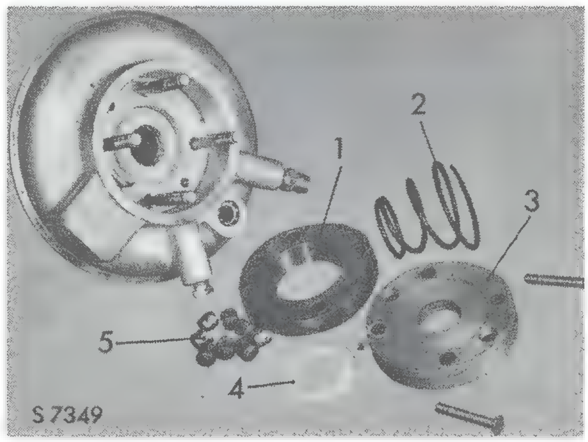
183b FRONT BRAKE ACTUATORS – Removal and Disassembly

Before disconnecting hoses, identify hoses in relation to actuator ports to ensure correct installation. Service port is nearest chassis sidemember.

Before removing clamp, mark position of body in relation to cover. Spring tension may be overcome by hand pressure.

Piston may be removed from body by applying low air pressure to service port.

Spring (2), thrust washer (4), rollers (5) and lock collar (1) may be withdrawn from cover after removal of retainer (3).



Lock piston and sealing ring may be removed by applying low air pressure to lock port.

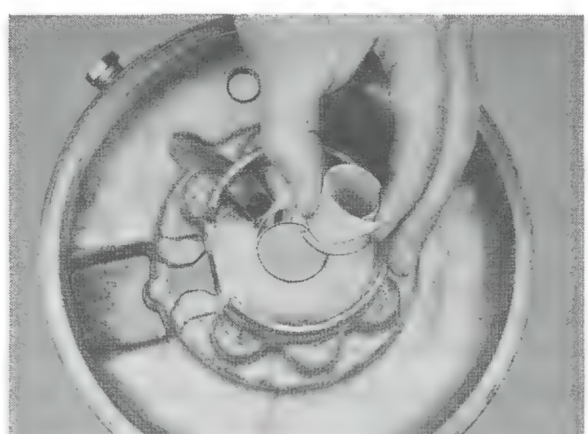
183c FRONT BRAKE ACTUATORS – Inspection and Reconditioning

Discard all components which will be renewed from a repair kit.

Check lock collar for signs of indentation and piston shaft for plating defects.

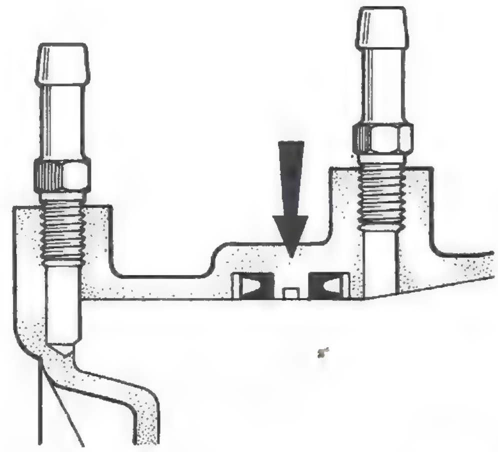
Ensure vents in cover and body are not obstructed.

Bush in cover may be extracted by curling ends together.



Before reassembly, smear all sliding surfaces and seals with recommended grease. Area between rollers in lock mechanism must be packed with grease.

When installing piston seals in body, ensure open side of seals face away from each other.



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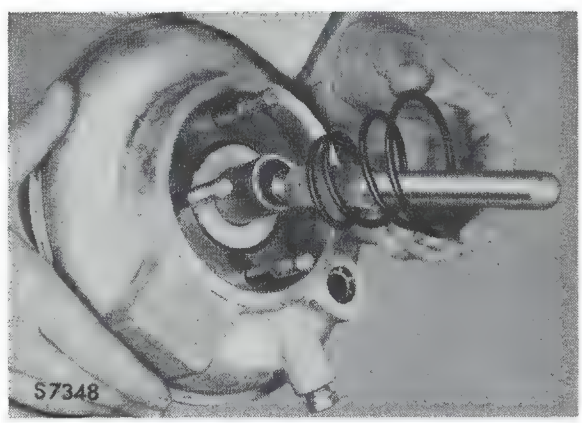
Install lock roller spring with smaller diameter coils towards thrust washer.



When installing actuator, locate gasket on actuator support, and adjust length of push rod so that actuator cover just contacts gasket. Screw push rod on to push shaft rod a further half a turn, to provide clearance between push rod and expander, before tightening locknut.

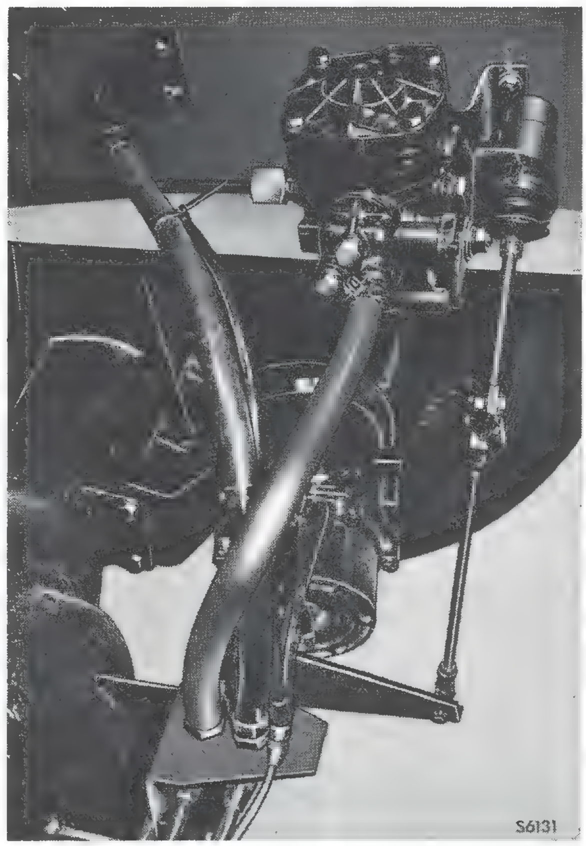
184 REAR BRAKE ACTUATORS

Information concerning the rear brake actuators is contained in Section 163. When carrying out the leakage test, a defective service piston front seal, located nearest open end of end cover, or secondary piston seal may be detected by holding secondary/parking brake control lever in 'UNLOCK' position.

185 LOAD SENSING VALVE

The Clayton Dewandre load sensing valve, incorporated in the service air line to the rear brake actuators, allows the degree of braking at the rear wheels to be increased or decreased according to the variation in load on the rear axle, even during a brake application.

The valve is mounted on the chassis side-member adjacent to the rear axle and is connected through a spring-loaded knuckle joint and adjustable connecting rod to a bracket on the rear of the axle casing.



When the vehicle is unladen and there is only slight deflection of the road springs, the knuckle joint mounting plate will be in contact with the lower stop on the valve housing. In this condition only a small proportion (approximately one quarter) of the air pressure delivered from the footbrake valve to the load sensing valve is allowed to act on the rear brake actuators.

As the load on the rear axle is increased, the proportion of air pressure delivered by the load sensing valve to the rear actuators is increased until, with the valve in the maximum load position, the air pressure delivered to the rear actuators is the same as that delivered to the load sensing valve by the foot brake valve.

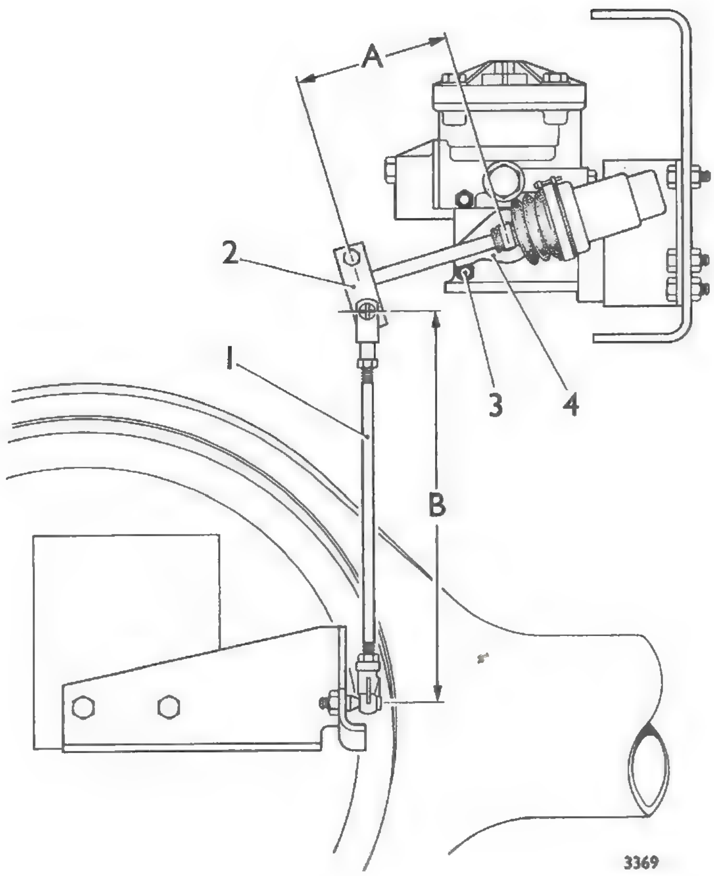
The valve comprises three pistons, operating in two bores at right angles to each other, and connected to a bearing which is in contact with a ramp operated by the knuckle joint mounting plate.

185a LOAD SENSING VALVE – Linkage Adjustment

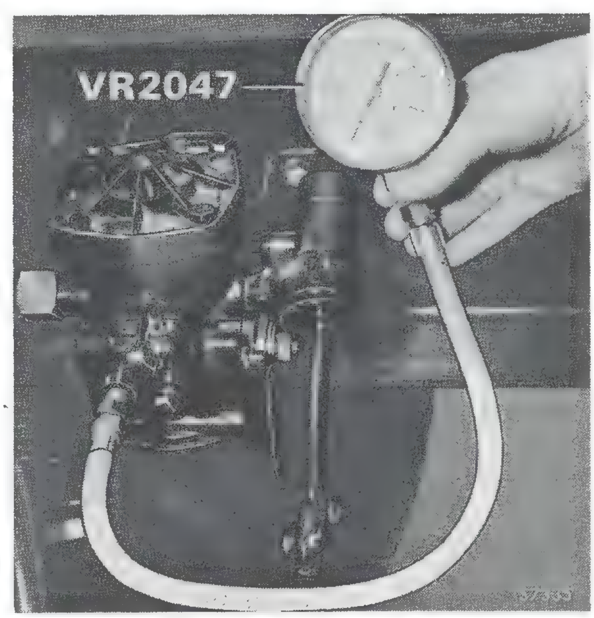
During linkage adjustment, no trailer should be coupled to tractor.

To adjust linkage, locate clamp (2) on lever of knuckle joint so that dimension 'A' from centre of pivot to centre of clamp is 4.64 in.

Disconnect rod (1) from clamp and hold lever down against tension of return spring so that knuckle joint mounting plate (4) contacts lower stop (3). Do not load lever enough to cause movement within knuckle joint. Measure distance 'B' between centre of clevis pin hole in clamp and centre of connecting rod lower mounting, and adjust length of connecting rod to this dimension less 0.92 in. This will necessitate increasing of pressure on lever to overcome spring loading within knuckle joint when installing rod.



185b LOAD SENSING VALVE – Operating Test



If operation of valve is suspect after linkage adjustment has been checked, disconnect hose from outlet manifold of valve and install Gauge VR2047.

With connecting rod removed from clamp on knuckle joint lever, and lever held in maximum load position by return spring, charge air system to governor valve cut-out pressure and fully apply footbrake. Pressure registered on test gauge should be approximately the same as registered on vehicle service reservoir gauge.

185b LOAD SENSING VALVE – Operating Test (contd)

With lever in minimum load position, test gauge should register approximately one quarter of pressure registered on service reservoir gauge.

With footbrake still applied, move lever to several positions between maximum and minimum load stops and check that test gauge registers a change in pressure promptly and in accordance with lever position.

185c LOAD SENSING VALVE – Leakage Test

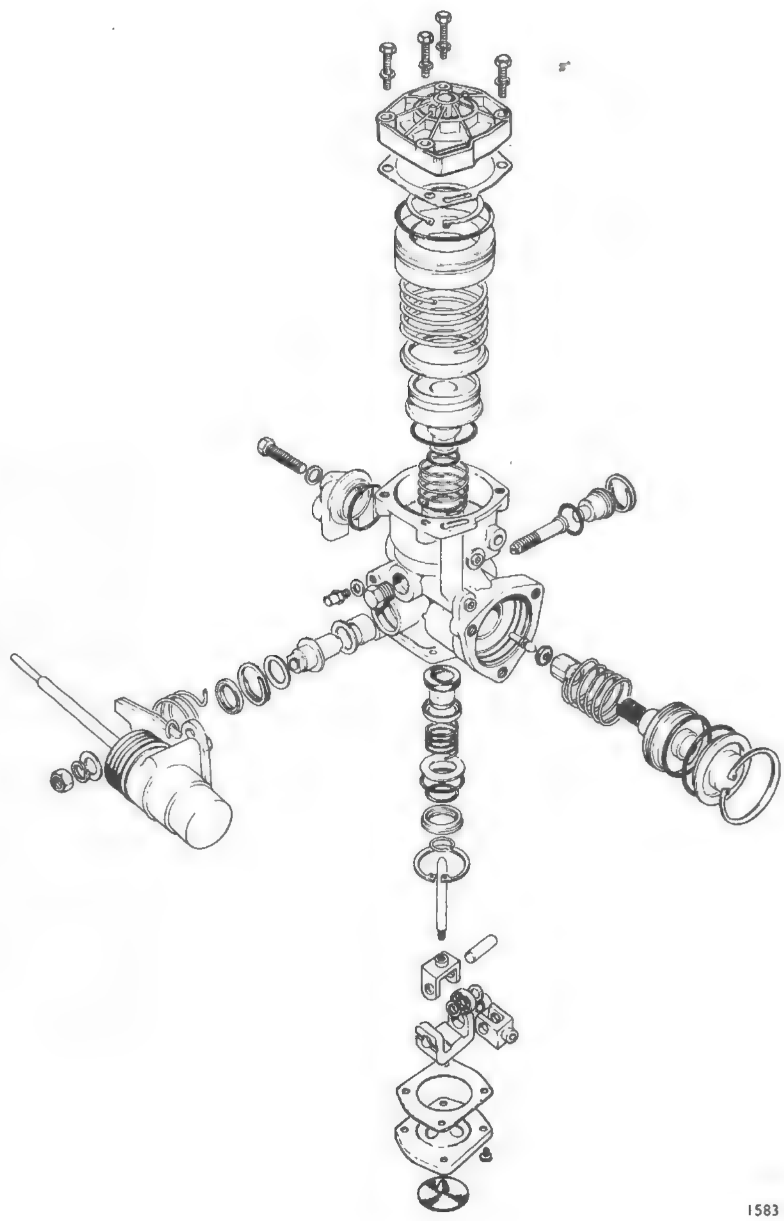
When checking for air leakage, charge system to governor valve cut-out pressure and, with footbrake applied, smear complete exterior of valve with soap solution.

Check for leakage with knuckle joint lever in maximum, minimum and midway positions. Lever must be held absolutely stationary at any position as slight movement of lever towards minimum load position will result in air being exhausted from diaphragm at base of valve.

185d LOAD SENSING VALVE – Disassembly

Piston, piston and guide return springs, guide and small push rod may be withdrawn after removal of circlip inside valve mounting flange.

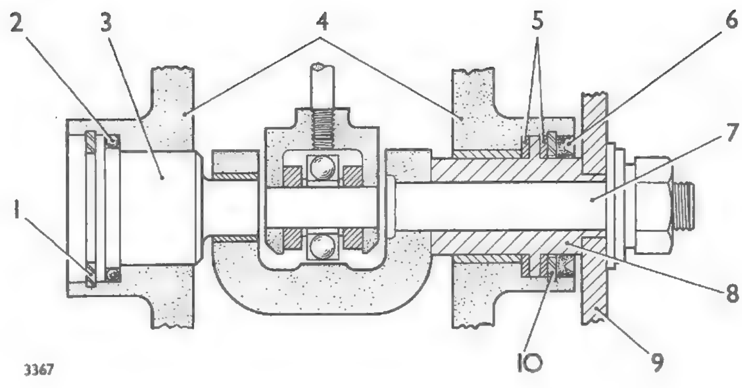
Piston assembly and spring may be withdrawn after removal of top cover. Pistons may be separated by removing circlip.



1583

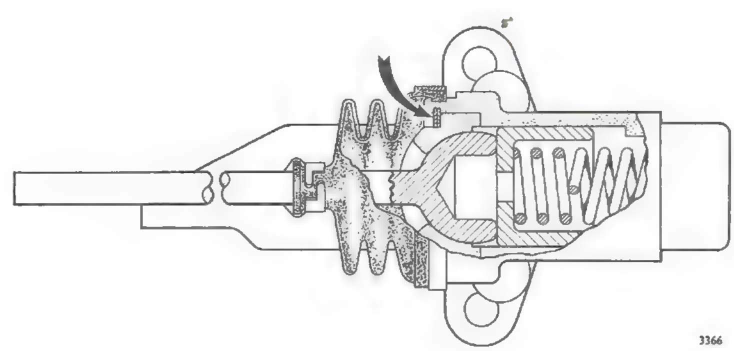
Pivot bolt (7) may be removed through opposite side of body (4) after removal of spring ring (1) securing plug (3) and seal (2).

If necessary, drive shaft (8) may be withdrawn after cutting rubber lip of seal (6) and removing metal rim of seal to provide access to spring ring (10). Note thrust washers (5) located each side of shaft flange.



Inlet/exhaust valve, support, spring and guide are retained in valve body by a circlip.

Knuckle joint may be dis-assembled by removing spring ring underneath gaiter.

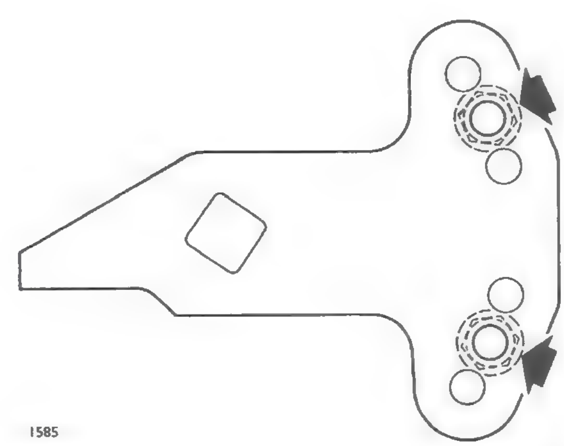


Discard all components which will be renewed from a major or minor repair kit.

185e LOAD SENSING VALVE – Reassembly

Before reassembly, liberally smear all sliding and load bearing surfaces and sealing rings with recommended grease.

Knuckle joint must be attached to mounting plate by means of holes arrowed.



186 NON-RETURN VALVES

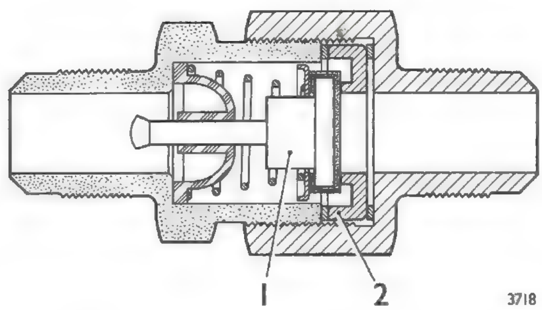
Non-return valves, identical to those described in Section 75, are incorporated in the tractor and trailer service reservoirs, and the secondary reservoir, at the supply connections. A line non-return valve is also incorporated in the air line between the compressor and the condensing reservoir.

When installing a line non-return valve, arrow on body must be in direction of condensing reservoir.

A biased non-return valve is included in the air line between the tractor service reservoir and the footbrake valve to maintain the service line pressure to the front and rear brake actuators 1.5 bar (20 lb/sq in.) less than the secondary line pressure. This ensures that the brakes cannot be locked on at full reservoir pressure by application of the footbrake during or after moving the secondary/parking brake control lever to the 'PARK' position.

Since the tractor service reservoir pressure gauge is on the lower pressure side of the valve, this gauge will read 7 bar (100 lb/sq in.) when the other gauges read 8.5 bar (120 lb/sq in.) at governor cut-out pressure.

The valve consists of a body and screw cap containing a flat-headed rubber valve (1) spring loaded against a removable valve seat (2).



When assembling valve, position a copper washer on each side of valve seat and ensure recessed side of seat contacts rubber valve.

When installing valve, ensure arrow on body is in direction of footbrake valve.

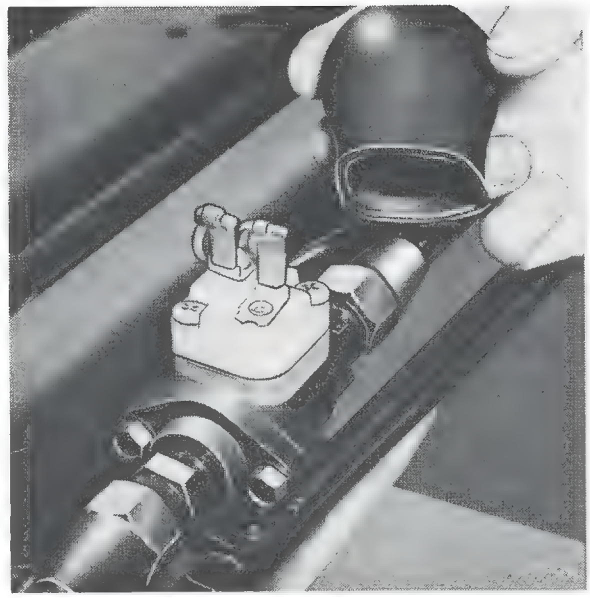
187 SAFETY VALVE

Information concerning the safety valve is contained in Section 105. Operating pressure of valve may be checked on secondary reservoir gauge by charging system with secondary/parking brake control lever held in the 'UNLOCK' position.

188 STOP LAMP SWITCHES

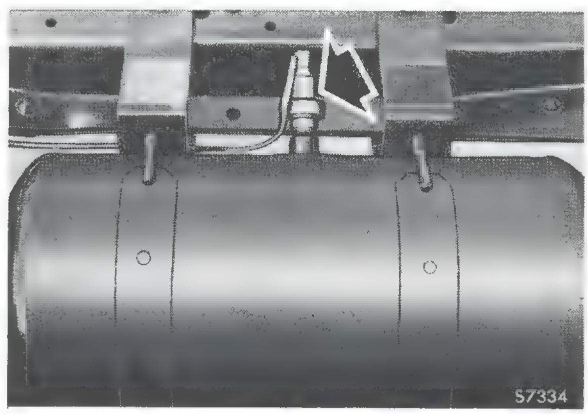
A stop lamp switch similar to that described in Section 106 is incorporated in the air line to the rear brake actuators.

A second stop lamp switch is combined with the secondary line change-over valve.



189 LOW AIR PRESSURE WARNING SWITCH

A low air pressure warning switch is incorporated in the secondary reservoir to actuate a buzzer and warning lamp in the vehicle if the pressure falls below the minimum required. The switch is a sealed unit and consists of a body, spring-loaded diaphragm and contacts.



189a LOW AIR PRESSURE WARNING SWITCH – Operating Test

With system fully charged and engine stopped, turn key-start switch to running position and release pressure from secondary reservoir by applying and releasing parking brake.

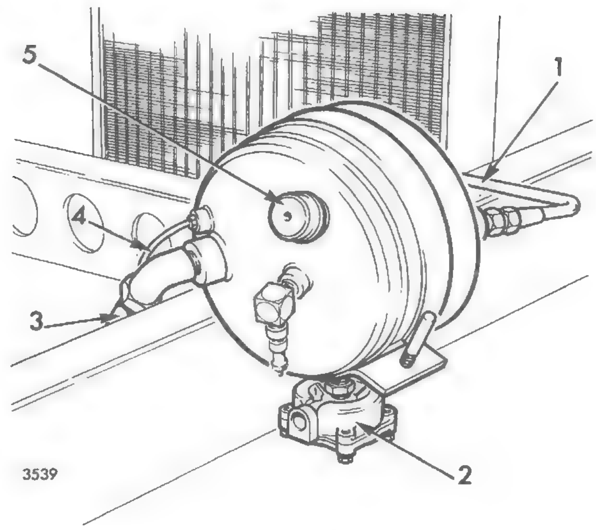
Note pressure registered on secondary reservoir gauge at which buzzer and warning lamp operate. If switch fails to operate within specified limits it must be renewed.

190 CONDENSING RESERVOIR

A condensing reservoir, fed by air from the compressor via a non-return valve and air line (3), is mounted on the chassis sidemember at the front of the vehicle to ensure maximum air cooling and condensation of water vapour.

The reservoir is fitted with an automatic water drain valve (2) and a non-adjustable ball-type safety valve (5).

Air line (1) supplies the dual air reservoir and secondary reservoir, and air line (4) supplies the compressor governor valve.



191 AIR RESERVOIRS

A dual reservoir comprising a tractor service air reservoir and a trailer service air reservoir combined in one assembly is mounted on the chassis crossmember.

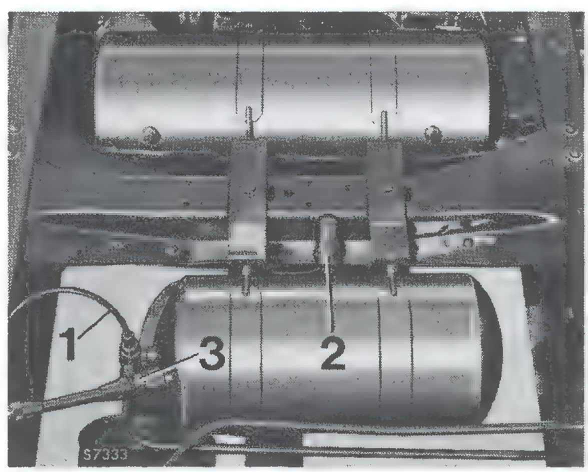
The reservoirs, which are fed with dry air from the condensing reservoir via non-return valves, supply air to the footbrake valve and the trailer service reservoir also supplies the trailer emergency line.

The reservoirs are provided with drain plugs.

A secondary reservoir, mounted on the chassis crossmember adjacent to the dual air reservoir, supplies air to the secondary/parking brake control valve and the trailer secondary line.

The reservoir, which is supplied with dry air from the condensing reservoir via a non-return valve (3), incorporates a low pressure warning switch (2) which actuates a buzzer and a warning lamp inside the vehicle if the air pressure falls below the minimum required. Air line (1) supplies the secondary reservoir pressure gauge.

The reservoir is provided with a drain plug.

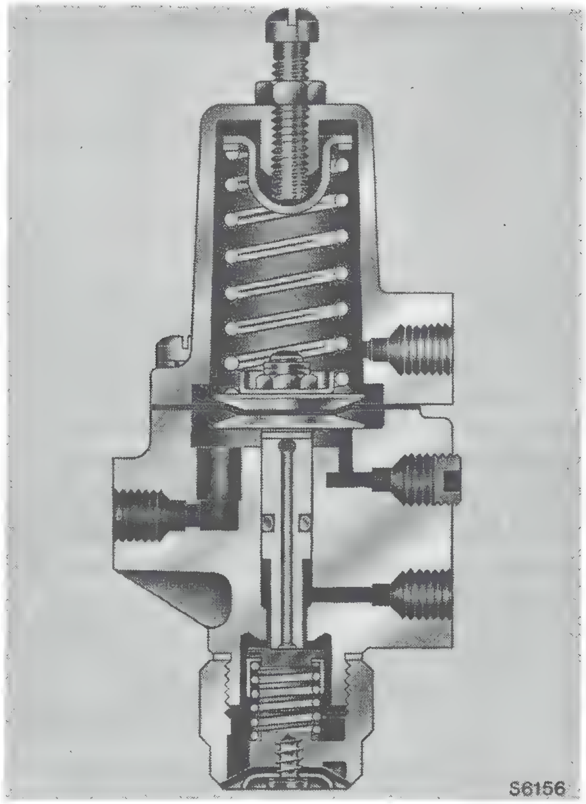


192 AUTOMATIC DRAIN VALVE

Refer to Section 110.

193 COMPRESSOR GOVERNOR VALVE

The compressor governor valve is similar to that described in Section 60 except that the top cover is sealed and provided with a tapped inlet port. A nylon pipe connects the port to the parking brake supply air line from the secondary/parking brake control valve. When the secondary/parking brake control lever is in the 'UNLOCK' position, air pressure enters the governor valve cover and prevents the valve from cutting-out at the normal operating pressure. If necessary, the system may be charged to the safety valve operating pressure.


S6156

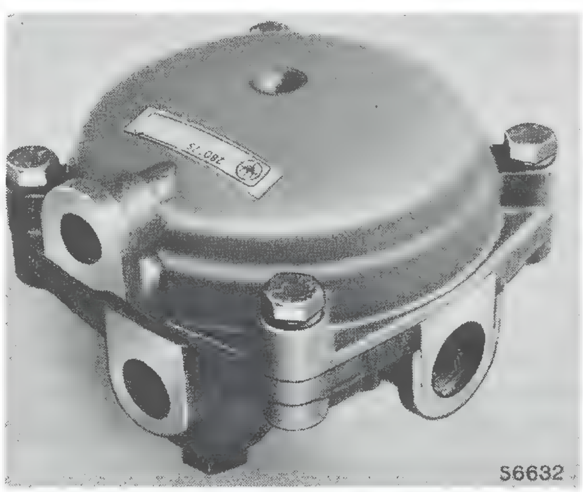
When checking the governor valve cut-out pressure on the vehicle dual air pressure gauge note that the tractor service reservoir gauge will read 7 bar (100 lb/sq in.) when the other gauges read 8.5 bar (120 lb/sq in.) due to the presence of a biased non-return valve in the service system.

194 COMPRESSOR ANTI-FREEZER

Information concerning the compressor anti-freezer, which may be connected to the compressor intake, is contained in Section 258.

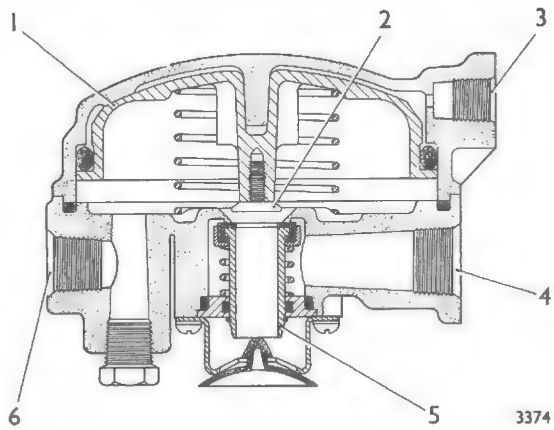
195 RELAY VALVE

To eliminate time lag during trailer brake application and release, a relay valve is incorporated in the trailer secondary brake line on the vehicle. The valve, which is mounted on the inside of the chassis side-member, provides a direct means of air supply from the secondary air reservoir to the trailer secondary line coupling.


S6632

The valve consists of a body and cover containing a spring-loaded piston and an inlet/exhaust valve assembly.

Air pressure delivered from the secondary/parking brake control valve enters the top of the valve through the signal port (3), causing the piston (1) to move down until the exhaust valve seat (2) contacts the inlet valve (5). Further increase in this air pressure causes the inlet valve to move off its seat allowing air direct from the reservoir to enter the valve through the supply port (4) and exit from the delivery port (6).



The pressure of the air passing through the valve acts on the lower face of the piston causing the piston to rise and close the inlet valve when the pressure below the piston is equal to that above, so bringing the valve into a balanced condition.

Any further increase in the pressure delivered from the secondary/parking brake control valve will cause the piston to move down and open the inlet valve, increasing the delivered pressure from the valve until balance is once again achieved.

A decrease in the pressure delivered from the secondary/parking brake control valve will cause the piston to rise and the exhaust valve to open, allowing the pressure delivered from the valve to exhaust through the centre of the inlet valve and out of the exhaust diaphragm until balance is once again achieved.

When no air pressure is being delivered from the secondary/parking brake control valve the piston is in the fully raised position with the exhaust valve open and the inlet valve closed.

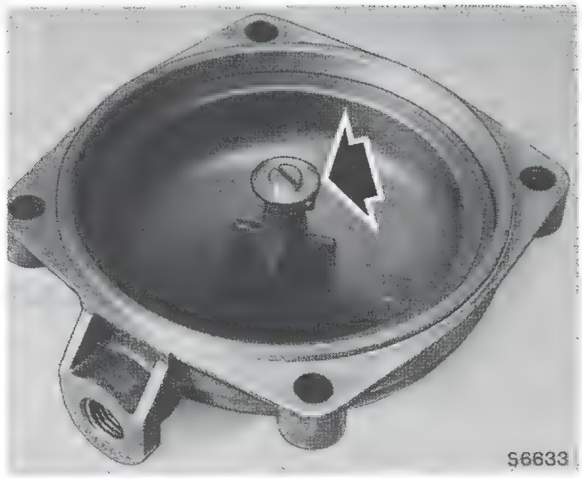
195a RELAY VALVE – Operating and Leakage Test

To test for correct operation of valve connect an air supply of constant pressure to supply port and a variable air supply to signal port. Check that air pressure delivered from valve at delivery port reacts immediately and in accordance with air pressure at signal port.

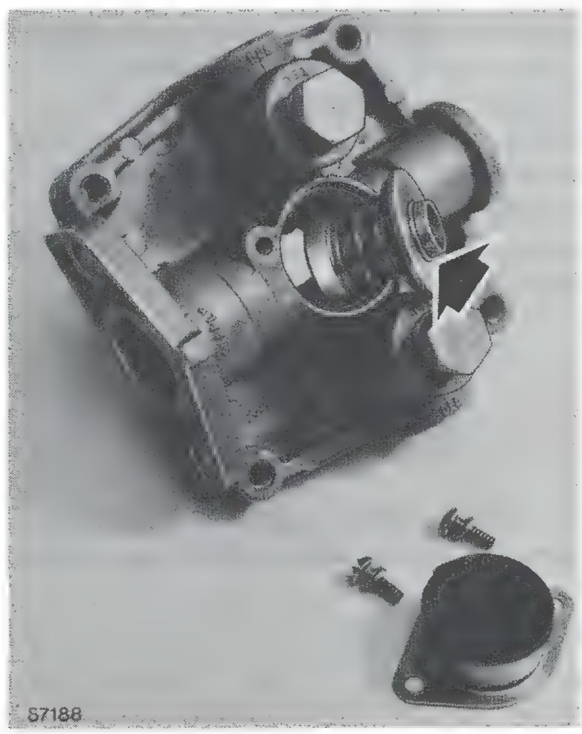
With valve in a balanced condition check for leaks with soap solution. No leakage is permissible.

195b RELAY VALVE — Disassembly

Removal of four bolts securing top cover provides access to piston, piston return spring and exhaust valve seat (arrowed).



Access to inlet valve assembly is gained after removal of retainer. Inlet/exhaust valve, spring and valve support may be separated from guide by removing circlip.



195c RELAY VALVE — Inspection and Reassembly

Discard all components which will be renewed from a repair kit.

Inspect sliding surfaces of piston and cover for wear and scores.

On reassembly, liberally smear all sliding surfaces and seals with recommended grease.

196 FOOTBRAKE VALVE

The footbrake valve is similar to that described in Section 114 except that the front half of the valve controls the tractor service system and the rear half controls the trailer service line.

When carrying out the operating test note that the pressure registered on the tractor service test gauge will be approximately 1.4 bar (20 lb/sq in.) less than the pressure registered on the trailer service line test gauge due to the presence of a biased non-return valve in the service system.

197 COMPRESSOR CYLINDER HEAD

Refer to Section 115.

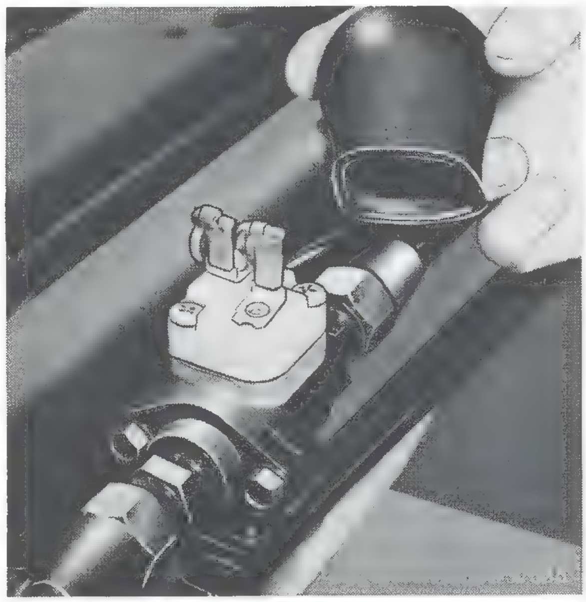
198 COMPRESSOR

Refer to Section 116.

199 CHANGE-OVER VALVES

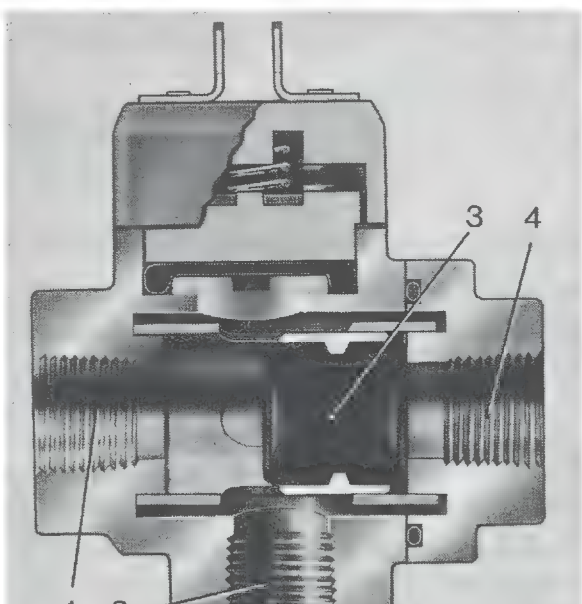
A change-over valve is incorporated in the system to prevent loss of air through the secondary side of the secondary/parking brake control valve when the parking brake is applied. The valve also prevents application of the tractor rear brakes when the secondary system is brought into operation by means of the secondary/parking brake control valve.

A stop lamp switch is attached to the valve body.



The valve consists of a body which has two supply ports and one delivery port. The body contains a shuttle valve which is free to move along a guide.

When the secondary/parking brake control valve lever is moved towards the 'PARK' position compressed air enters supply port (1) and moves the shuttle valve (3) to the opposite end to seal the other supply port. This allows air to pass through the delivery port (2) to the front brake actuators and prevents leakage through supply port (4) to the secondary side of the secondary/parking brake control valve.

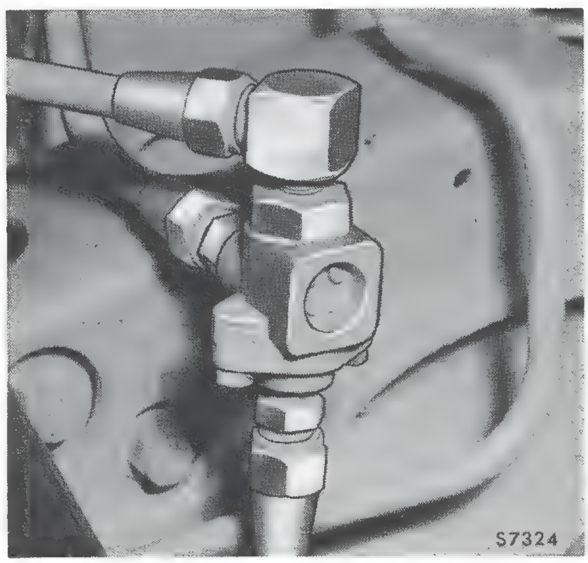


199a CHANGE-OVER VALVE — Leakage Test

Leakage at secondary/parking brake control valve side of change-over valve may be detected by charging system to governor valve cut-out pressure and smearing exhaust aperture at rear of secondary/parking brake valve with soap solution. Leakage in excess of a ½ in. bubble in five seconds, with secondary/parking brake control lever in the 'UNLOCK' position, indicates a faulty shuttle valve.

Leakage at rear brake actuator side of change-over valve may be detected by charging system to governor valve cut-out pressure and again smearing exhaust aperture at rear of secondary/parking brake valve with soap solution. Leakage in excess of a ½ in. bubble in five seconds, with the secondary/parking brake control lever in 'AUX' position indicates a faulty shuttle valve.

A change-over valve is also incorporated in the air line to the trailer service coupling head to enable the tractor secondary system to operate through the service line coupling when a trailer having a two-line brake system is used with the vehicle. The valve does not incorporate a stop lamp switch.



When a trailer having a three-line brake system is used with the vehicle, the change-over valve prevents air leakage through the secondary-park coupling head.

When a trailer having a two-line brake system is used with the vehicle, the secondary line flexible hose must be connected to the secondary-park coupling head and the change-over valve prevents air leakage through the relay valve.

Change-over valve may be checked for leakage by charging system to governor valve cut-out pressure and smearing secondary-park coupling head with soap solution. Leakage in excess of a ½ in. bubble in five seconds, with footbrake applied, indicates a faulty shuttle valve.

With secondary line flexible hose connected to secondary-park coupling head, smear exhaust diaphragm at rear of footbrake valve with soap solution. With secondary/parking brake control lever in 'AUX' position leakage from footbrake valve in excess of a ½ in. bubble in five seconds indicates a faulty shuttle valve.

The change-over valves are identical in construction except for the stop lamp switch and may be disassembled by removing end cover.

Before reassembly, smear shuttle valve sleeve and inner surface of guide with recommended grease.

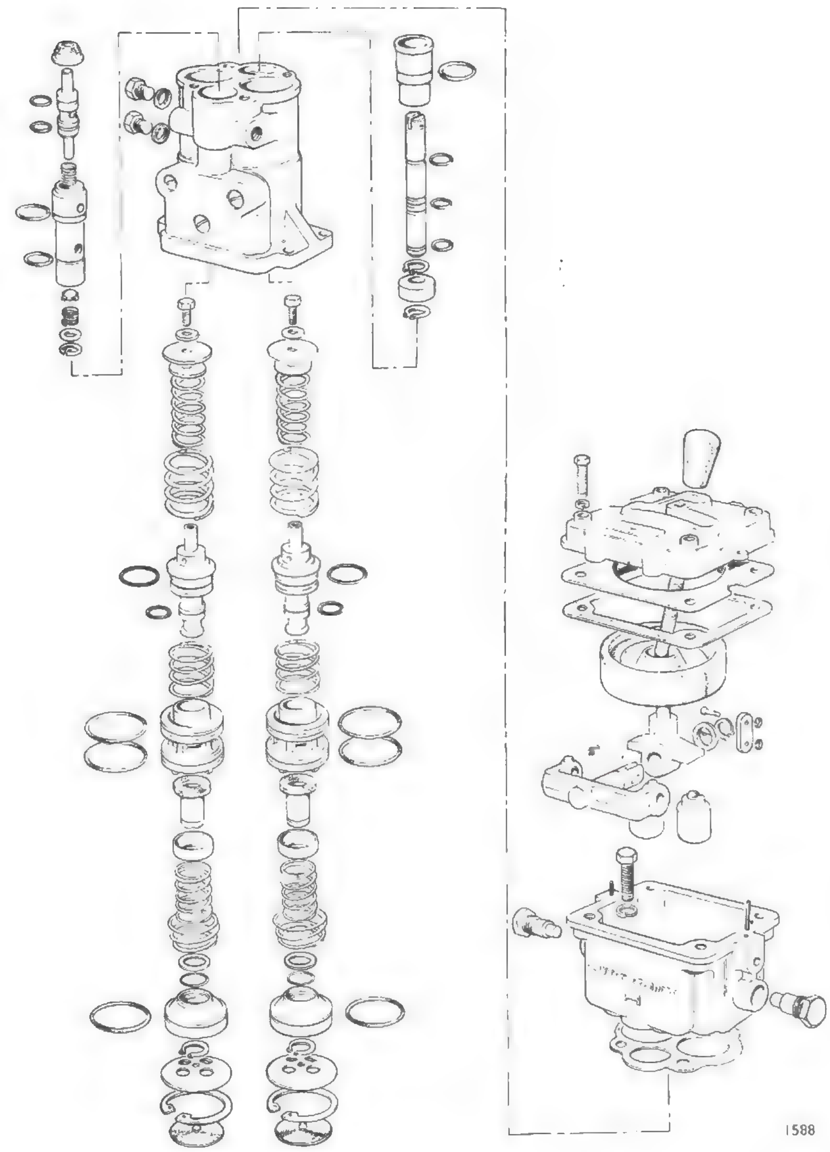
200 SECONDARY/PARKING BRAKE CONTROL VALVE

The secondary/parking brake control valve, mounted by the driver's seat, provides a means of applying the tractor front brakes and the trailer brakes in the event of failure of the service system. The valve also applies the brakes on the front and rear wheels of the tractor for parking.

The valve is supplied with air from the secondary reservoir and when the control lever is in the 'OFF' position the valve supplies reservoir pressure to the actuator locks to hold them disengaged.

The operation and construction of the valve is similar to that described in Section 176 except that the 'AUX' lever position is at the opposite end of the cover from the 'UNLOCK position. Movement of the lever towards the 'AUX' position applies the tractor front brakes and the trailer brakes, the amount of brake application being proportional to the effort applied to the lever.

Disassembly of the valve is as described in Section 176b except that two identical spring-loaded valve assemblies are contained in the body instead of one valve assembly and a blanking plug.



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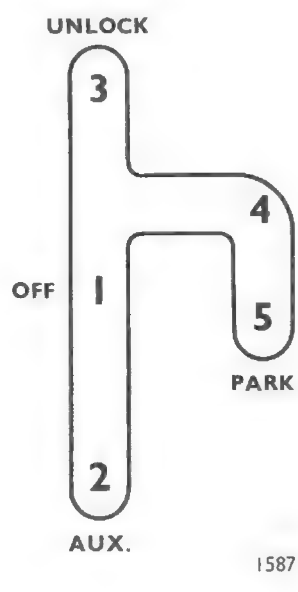
200a SECONDARY/PARKING BRAKE CONTROL VALVE – Operating Test

To check operation of valve, install air pressure gauges in air line to actuator locks and air lines to secondary/park ports on front and rear actuators.

With lever in appropriate position and system charged to governor valve cut-out pressure, the following readings should be recorded on test gauges.



1587

Lever Position	Pressure at Lock Ports	Pressure at Secondary/Park Ports on Rear Axle	Pressure at Secondary/Park Ports on Front Axle
1	As secondary reservoir	Zero	Zero
2	As secondary reservoir	Zero	As secondary reservoir
3	As secondary reservoir	As secondary reservoir	As secondary reservoir
4	Zero	As gate setting – approx. 5 bar (70 lb/sq in.)	As gate setting – approx. 5 bar (70 lb/sq in.)
5	Zero	Zero	Zero

Recharge system and move lever to several positions between 1 and 2, checking that appropriate gauge registers pressure variation promptly and in proportion to lever movement. When lever is held stationary between positions 1 and 2, gauge should show a stabilised pressure in proportion to the lever position.

Repeat this test with lever between positions 1 and 3.

AIR PRESSURE SERVO-ASSISTED HYDRAULIC SYSTEM

The service brake operates on the front and rear wheels through a hydraulic system assisted by a Clayton-Dewandre air pressure servo.

The parking brake operates on the rear wheels only, through a system of cables and rods.

The hydraulic brakes are of the Lockheed two-leading-shoe type operated by a master cylinder mounted with the servo on the chassis sidemember.

The servo utilises air pressure developed by a single cylinder engine driven compressor. A compressor governor valve and a safety valve are incorporated in the system.

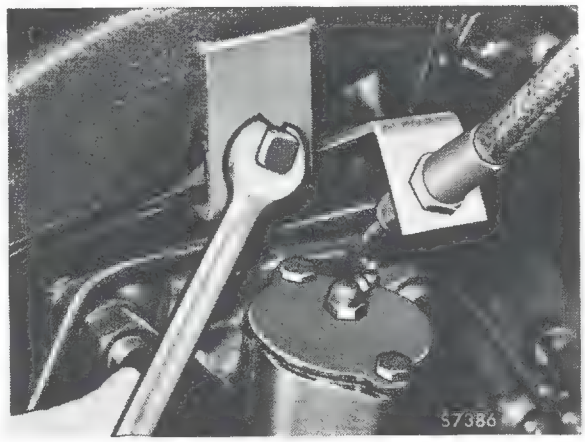
201 BRAKE ADJUSTMENT

Before adjusting the brakes, check and if necessary, adjust the hub bearings.

Check also for excessive wear of the shoe facings. These can be examined through the inspection holes in each flange plate.

There are two adjusters on each front brake assembly and one adjuster on each rear brake assembly.

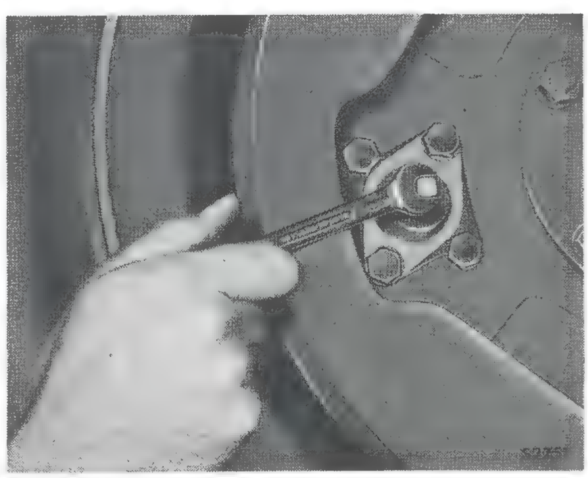
To adjust front brakes, fully charge air system and rotate one of the adjusters until shoe is hard against drum.



Back off adjuster until drum is free to rotate and, with wheel rotating in forward direction sharply apply footbrake to centralize shoe. Repeat this operation until no further adjustment can be made then repeat procedure with remaining adjuster.

When adjusting shoes into contact with drum, turn adjusters clockwise on left-hand brake and anti-clockwise on right-hand brake.

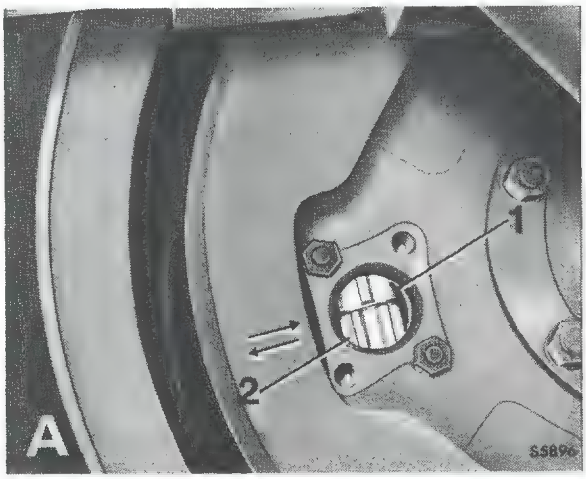
To adjust rear brakes, turn adjuster on each brake assembly clockwise until shoes are hard against drums. Centralize shoes by applying heavy pressure to brake pedal, three times in quick succession and again adjust shoes into contact with drum. Repeat this operation until no further adjustment can be made, re-charging air system as necessary, then back off adjusters until shoes are just clear of drums.

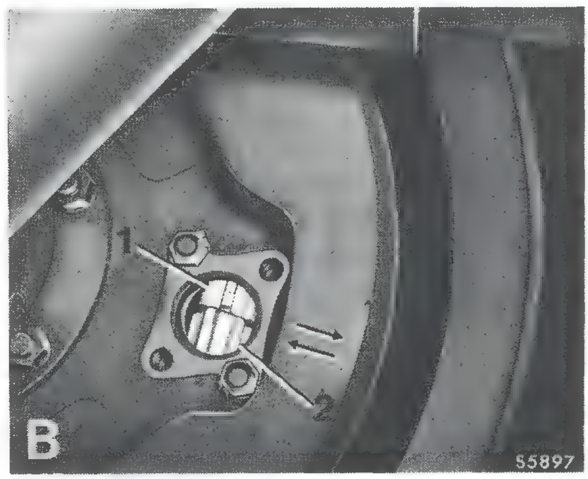


The parking brake is adjusted automatically with the footbrake adjustment and normally no other adjustment is required. If there is excessive parking brake lever travel after footbrake adjustment has been completed then rear brakes must be centralized as described under 'Rear Brake Adjustment after Reconditioning' before adjusting parking brake linkage.

201a REAR BRAKES — Adjustment after Reconditioning

If for any reason the rear brakes have been disassembled, or the brake shoes disturbed, it is essential that the brake shoes are centralized.



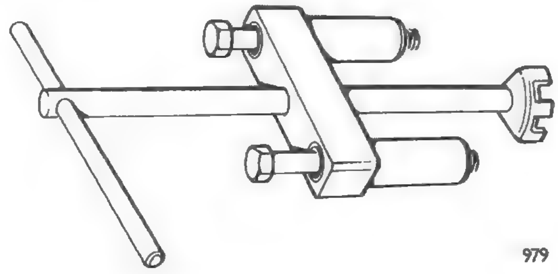


To centralize shoes, fully charge air system and withdraw adjuster pinion assembly by removing two bolts without locking tabs. Rotate secondary shoe adjuster sleeve (1) to off position. Left-hand brake adjuster is shown at 'A' and right-hand adjuster at 'B'.

While turning brake drum in forward direction, rotate primary shoe adjuster sleeve (2) in direction of arrow until primary shoe just prevents drum from rotating. After centralizing primary shoe by applying heavy pressure to brake pedal, three times in quick succession, repeat adjustment and centralizing operation until no further adjustment can be made.

Rotate secondary shoe adjuster sleeve in direction of arrow until shoe is hard against drum and repeat centralizing and adjustment operation with secondary shoe adjuster sleeve.

Use Adjuster VR2080 to rotate adjuster sleeves.



Install adjuster pinion assembly ensuring that pinion teeth engage splined adjuster sleeves. Slight adjustment of sleeves may be required. Back off adjuster anti-clockwise until drum is free to rotate.

202 BLEEDING THE HYDRAULIC SYSTEM

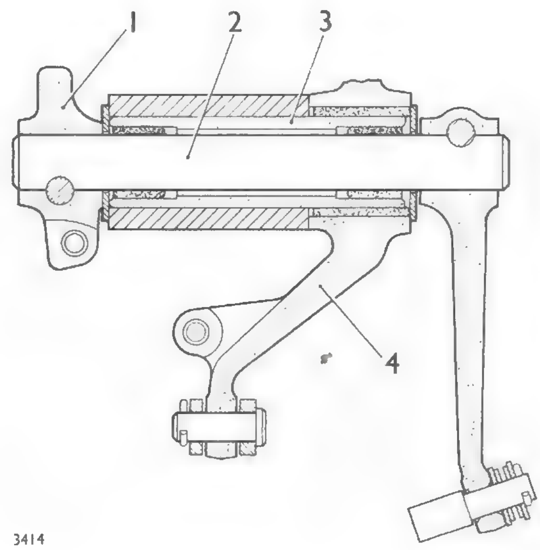
Before bleeding brakes, exhaust air from servo, release parking brake and back off front brake adjusters completely.

Bleed each brake in turn, using rapid full travel strokes of brake pedal, in the sequence left-hand rear, right-hand rear, left-hand front, right-hand front.

203 BRAKE PEDAL AND LINKAGE

The brake pedal pivots on a shaft mounted on the steering gear and on right drive vehicles the shaft also carries the clutch pedal.

On left drive vehicles the brake pedal (4) pivots on a sleeve (3) which is bushed to support the clutch pedal (1) and shaft (2).



The bushes are of the non-metallic type.

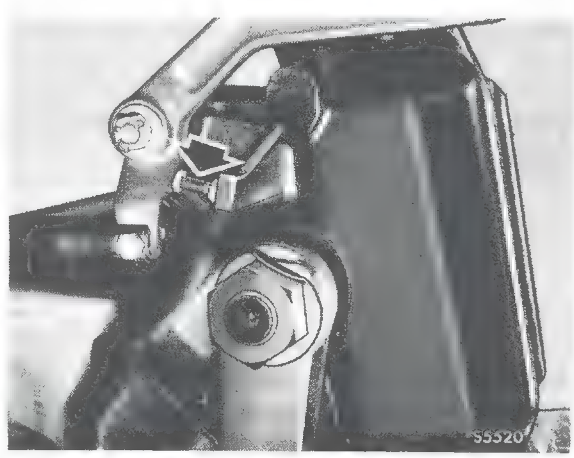
The pedal lever is connected by a push rod and relay lever to the servo pull rod.

The relay lever is supported by brackets attached to the chassis frame and pivots on a non-metallic bush.

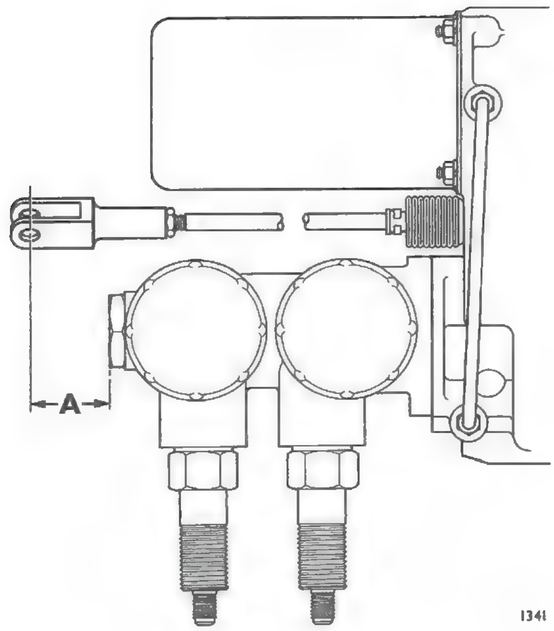
203a BRAKE PEDAL SETTING

It is not usually necessary to alter the brake pedal setting unless the stop bolt has been disturbed or parts of the linkage renewed.

Setting is adjusted by disconnecting push rod from relay lever and adjusting pedal stop bolt (arrowed) on right drive models, or stop lamp switch on left drive models, until distance between pedal lever and underside of toe panel is 1.00 in.



Check adjustment of servo pull rod by disconnecting return spring and lightly pulling rod out of servo until resistance is felt. Centre of pull rod hole should be 8.60 in. forward of front face of master cylinder plug on left drive vehicles.



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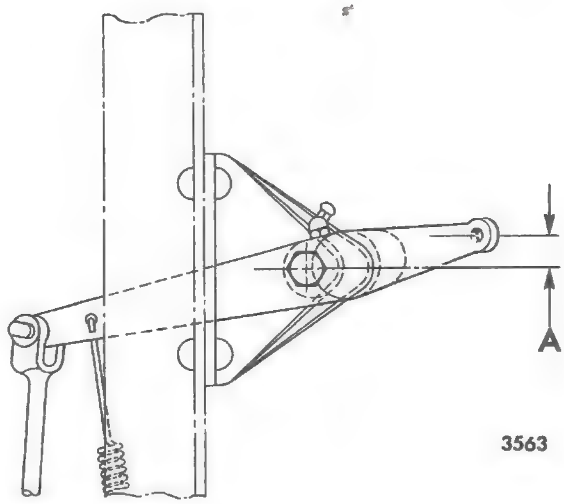
On right drive vehicles, adjust servo pull rod clevis until dimension 'A' between push rod clevis hole and relay lever pivot is 0.33 in.



3563

With push rod held forward so that pedal is in contact with stop, and rod pulled lightly out of servo, adjust push rod clevis until pin hole in rod aligns with pin hole in relay lever.

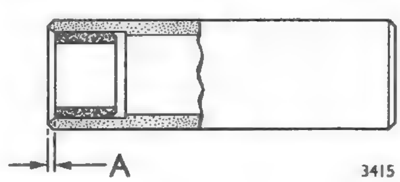
After installing clevis pin back off pedal stop bolt a third of a turn to provide pedal free travel.

203b BRAKE PEDAL AND LINKAGE — Bush Renewal

The brake pedal sleeve and relay lever bushes are pre-finished and do not require reaming on assembly.

When renewing brake pedal bush, press bush into bore until flush with pedal outer face.

On left drive vehicles press bushes into brake pedal sleeve so that dimension 'A' is 0.06 in.



3415

Press sleeve into steering gear until flush with clutch pedal side of gear.

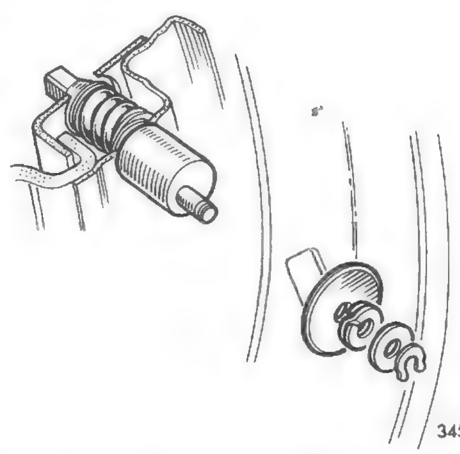
Before assembly, liberally smear bushes with recommended grease.

204 BRAKE DRUMS

Refer to Section 34.

205 FRONT BRAKE SHOES

The front brakes are similar to those described in Section 97 for Models ERT and YRQ except that the shoe adjusters are of the eccentric peg type.

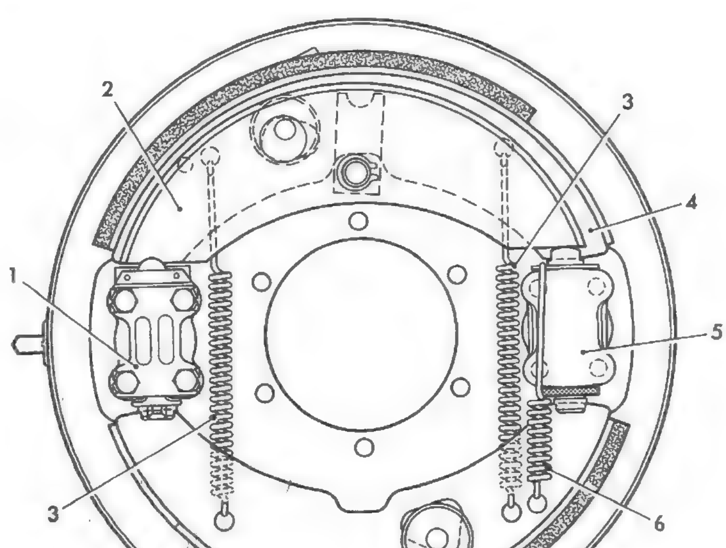


3452

206 REAR BRAKE SHOES AND ADJUSTERS

The rear brakes are of the two leading shoe type with fabricated shoes, and facings secured by rivets. The upper shoe (4) is located in a flanged carrier (2) which enables the shoe to operate as a leading shoe. Two pull-off springs (3) hold the shoes and carrier in contact with the adjuster (5) and expander (1). A third spring (6) connects the adjuster end of the primary shoe to a plate on the secondary shoe side of the adjuster.

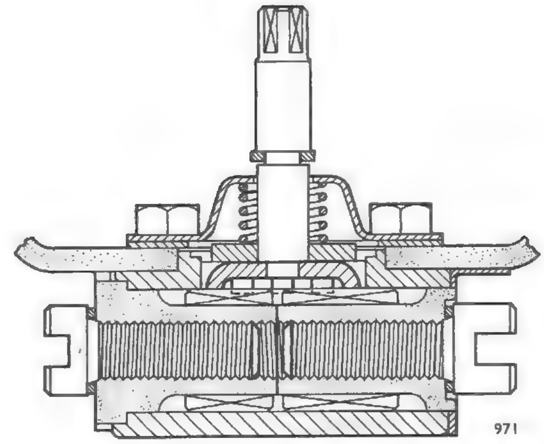
Each shoe is provided with a steady bolt which passes through a loose fitting collar in the shoe web, through a spacer, and is secured to the flange plate by a nut.



3453

The rear brake shoe adjuster comprises an adjuster assembly and an adjuster pinion assembly.

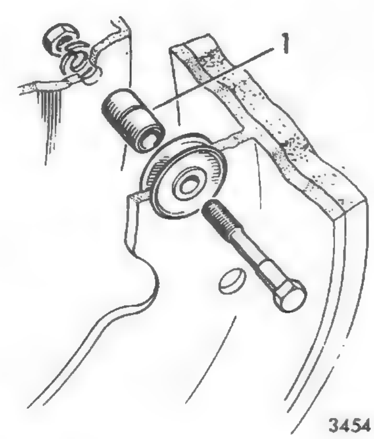
The adjuster assembly consists of a housing incorporating two left-hand threaded sleeves which accommodate the adjuster screws. The exterior of each sleeve is splined for engagement with the toothed sprocket on the pinion assembly.



Rotation of the pinion rotates the sleeves. As the adjuster screws are prevented from rotating by the brake shoe webs, they move in or out of the sleeves, depending on the direction the pinion is rotated. The inner ends of the sleeves abut each other and the sleeves can slide axially within the adjuster housing. The movement is limited in one direction by a shoulder on the primary shoe sleeve which locates in a recess in the housing.

Removal of the adjuster pinion assembly exposes the two adjuster sleeves. The sleeves may be rotated separately to enable each shoe to be adjusted individually for centralization purposes.

Shoes and carrier may be withdrawn after removing nuts securing steady bolts from back of flange plate. Carrier may be separated from shoe after unscrewing spacer (1) from steady bolt.

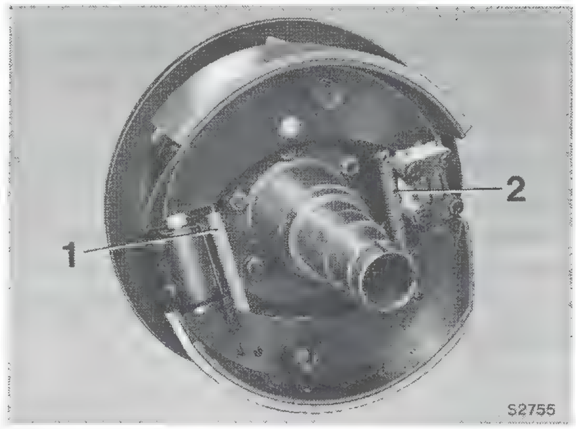


If necessary, rocker link may be removed by detaching circlip and withdrawing pin.
Before assembling shoe to carrier, smear shoe roller with recommended grease and insert into central hole in one of the brake shoes. Locate shoe within carrier so that loose fitting collar aligns with holes in carrier, and roller engages cut-out in carrier link.

Insert steady bolt through collar in shoe web, and assemble spacer with threaded end away from shoe web.

Before installation, arrange shoes so that toe of one shoe ie, end with greater length of exposed shoe flange, faces heel of other shoe, and hook pull-off springs to underside of shoe webs so that longer hooked end of each spring is attached to carrier shoe.

Springs are identified by colour, spring (1) on adjuster side is black with a patch of blue paint and spring (2) on expander side is grey on right-hand brake assembly and green on left-hand brake assembly.



Assemble shoes to flange plate with springs on the inside and with carrier shoe to abutment plate end of expander assembly. Engage tips of shoes with appropriate expander tappets and adjuster screws.

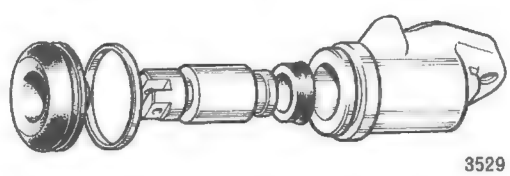
Attach bias spring to heel of primary shoe with longer hooked end to bracket on adjuster.

After installing shoes, assemble steady bolts through flange plate and tighten nuts to specified torque.

Adjust brakes as described in Section 201a.

207 FRONT BRAKE CYLINDERS

The front brake cylinders are bolted to the inside of the flange plates and contain a piston and seal protected by a dust cover attached to the open end of the cylinder.

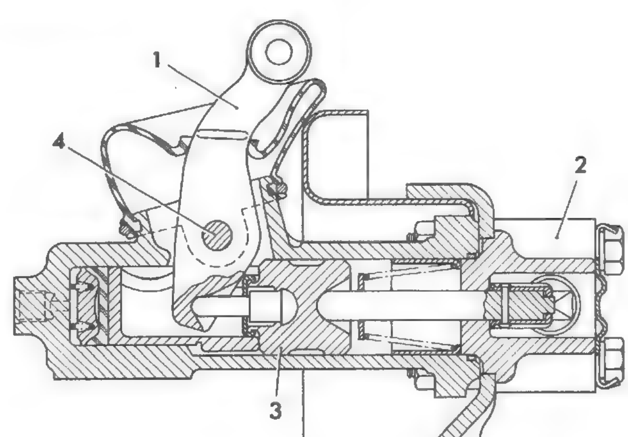


Seal lip faces towards inner end of piston.

Before assembling cylinder, smear piston and cylinder bore with recommended brake fluid.

208 REAR BRAKE CYLINDERS

Each rear brake cylinder is attached to the outside of the flange plate and operates an expander (2) on the inside of the plate. The parking brake operating lever (1) pivots on a pin (4) in the cylinder housing and operates the expander via a piston (3).



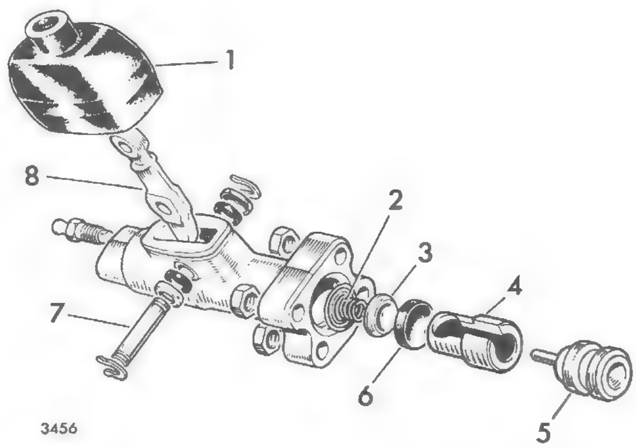
For access to heads of brake cylinder retaining bolts, hub and drum must be removed.

Parking brake operating lever (8) may be withdrawn after removing gaiter (1) and pivot pin (7). Pin is secured by circlips.

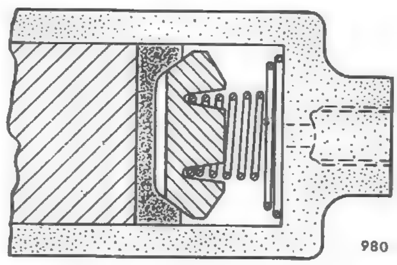
Pistons (4 and 5), seal (6), filler (3) and spring (2) may be ejected from cylinder by applying low air pressure to fluid connection.

Examine piston and bore for wear and scores. Seal should be renewed whenever cylinder is disassembled.

Before reassembly, smear pistons, seal, filler and cylinder bore with recommended lubricant.



Before installing seal and filler ensure spring locates in groove in filler, and recessed side of seal locates over filler.



When installing seal, filler and spring, hold cylinder vertically with open end of bore facing downwards.

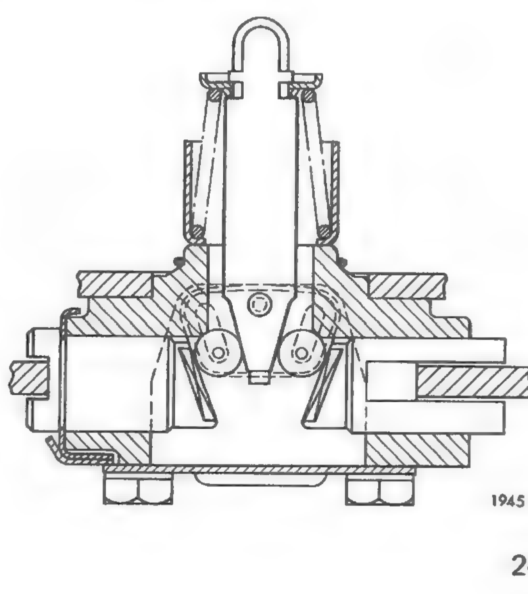
Before installing parking brake operating lever, insert longer piston with slotted end towards open end of cylinder and with slot aligned with lever aperture.

Smear lever pin with recommended grease before installation.

Insert remaining piston with recessed side towards open end of cylinder.

209 REAR BRAKE EXPANDERS

The expander unit comprises a body which houses two tappets. The inner ends of the tappets have inclined faces on which rollers attached to the expander push rod operate. The push rod return spring is located inside a sleeve which protrudes into the bore of the brake cylinder to act as a piston stop.

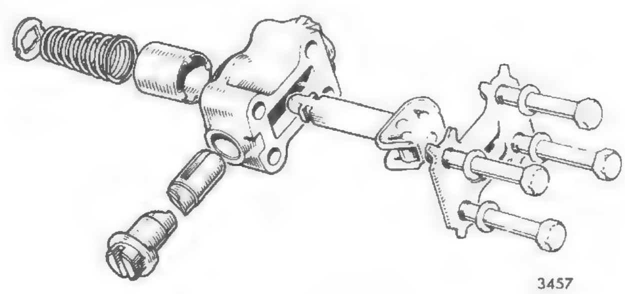


Bolts securing expander also support brake cylinder.

Spring and sleeve may be withdrawn after removing spring retainer.

Before reassembly, smear tappets and rollers with recommended lubricant.

When installing spring retainer, ensure it firmly engages in push rod groove.



3457

When installing tappets, insert tappet with dust cover in bore of body opposite abutment plate end, and ensure sloping ends of tappets are in correct relationship to push rod.

Before installing expander, locate seal on boss on rear of expander.

Adjust brakes as described under 'Rear Brake Adjustment after Reconditioning'.

210 MASTER CYLINDER

Information concerning the master cylinder is contained in Section 56. The cylinder front plug retains a spring-loaded check valve and provides attachment for the front hydraulic brake pipe.

211 NON-RETURN VALVE

Information concerning the non-return valve, incorporated in the servo reservoir supply connection, is contained in Section 75.

212 SAFETY VALVE

Refer to Section 57.

213 STOP LAMP SWITCH

A stop lamp switch of the spring-loaded plunger type is mounted above the brake pedal on left drive vehicles. The switch, which is a sealed unit, must be renewed if defective.

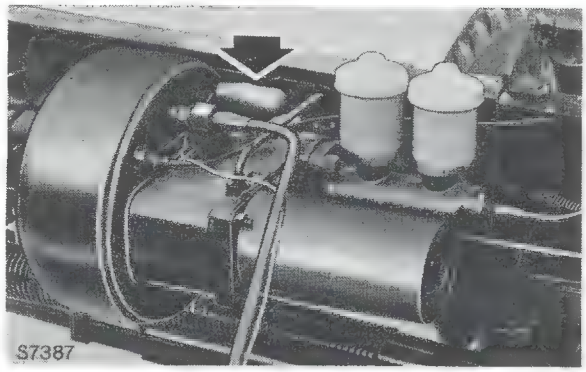
On right drive vehicles, a spring-loaded plunger type switch is mounted on a bracket attached to the chassis sidemember. The switch is operated by the brake pedal relay lever.

Position of switch bracket should be adjusted until switch plunger is depressed by 0.25 in. minimum with brake pedal in off position.

The switch is a sealed unit and must be renewed if defective.

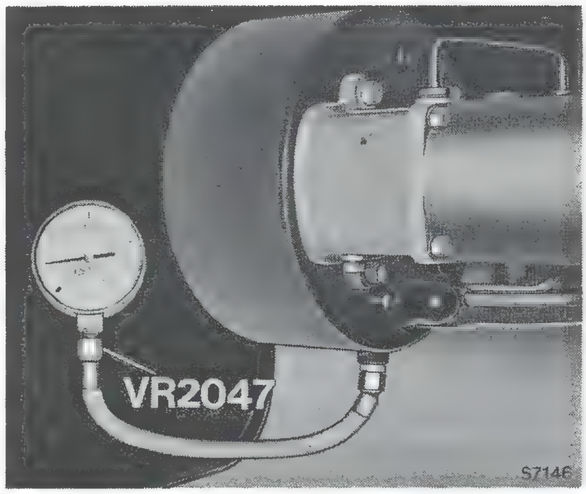
214 LOW AIR PRESSURE WARNING SWITCH

A low air pressure warning switch (arrowed) is incorporated in the servo reservoir and actuates a buzzer and warning lamp in the vehicle if the pressure in the reservoir falls below the minimum required. The switch is a sealed unit and consists of a body, spring-loaded diaphragm and contacts.



214a LOW AIR PRESSURE WARNING SWITCH – Operating Test

Operation of switch may be checked by installing Gauge VR2047 in reservoir drain plug boss.



With system fully charged and engine stopped, turn key-start switch to running position and release pressure by applying and releasing footbrake.

If switch fails to operate buzzer and warning lamp within specified limits it must be renewed.

215 COMPRESSOR GOVERNOR VALVE

Refer to Section 60.

216 AIR PRESSURE SERVO

Information concerning the air pressure servo, which is mounted with the hydraulic master cylinder on the inside of the chassis sidemember, is contained in Section 61.

217 COMPRESSOR CYLINDER HEAD

Refer to Section 115.

218 COMPRESSOR

Refer to Section 116.

219 PARKING BRAKE LEVER AND LINKAGE

The parking brake lever is bolted to a bracket attached to the chassis sidemember and is connected by a cable to a vertically mounted bell crank lever attached to the rear axle housing. Rods connect the bell crank lever to the rear brake cylinders.

219a PARKING BRAKE ADJUSTMENT

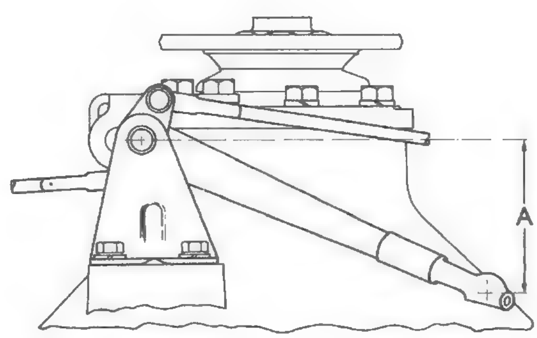
If excessive travel of the parking brake lever exists after the footbrake has been adjusted as described in Section 201a, the linkage must be reset.

Before setting linkage, adjust rear brake shoes into hard contact with drums, apply heavy pressure to brake pedal three times in quick succession, and again adjust shoes into contact with drums.

After disconnecting cable from parking brake lever, and spring from bell crank lever, position bell crank lever central in slot of lower bracket and adjust rod clevises until dimension 'A' is 2.94 in.

When adjusting length of rods, eliminate free travel in brake cylinders by pulling rods away from cylinder.

Adjust cable clevis until slack in cable is equal to ½ diameter of clevis hole before adjusting brakes.



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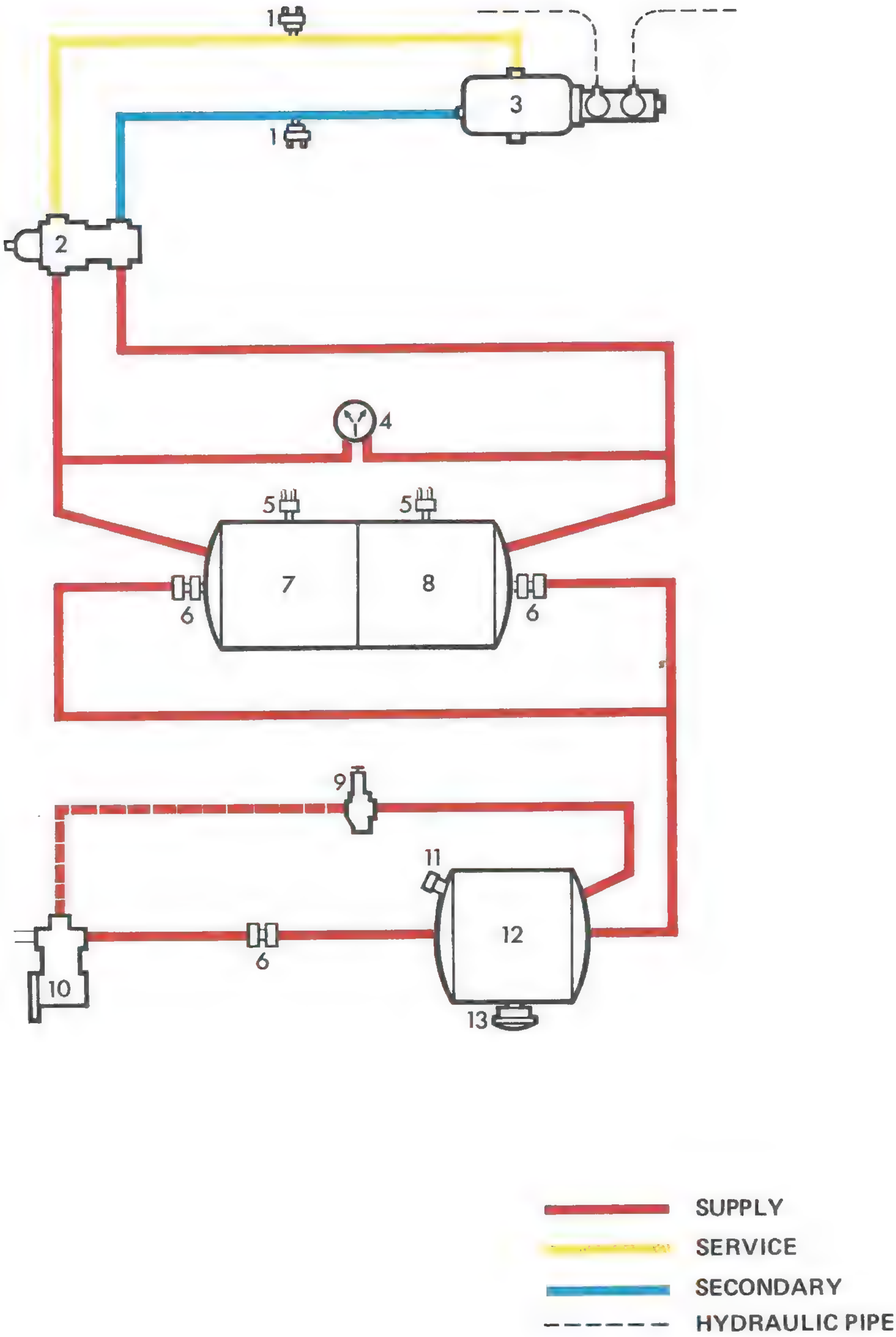
219b PARKING BRAKE LEVER AND CABLE

The parking brake lever and cable are similar to that used with direct-vacuum servo-assisted brakes and the information contained in Section 17b may be applied.

219c BELL CRANK LEVER

Refer to Section 46.

AIR PRESSURE OPERATED HYDRAULIC SYSTEM



1. Stop lamp switch
2. Footbrake valve
3. Master cylinder actuator
4. Dual air pressure gauge
5. Low pressure warning switch
6. Non-return valve
7. Service reservoir
8. Secondary reservoir
9. Governor valve
10. Compressor
11. Safety valve
12. Condensing reservoir
13. Automatic drain valve

Schematic diagram of braking system

The air/hydraulic braking system operated by the footbrake pedal applies the brakes by means of a master cylinder actuator and hydraulic tandem master cylinder. The actuator has a service and secondary means of air supply which are independent of each other and controlled by a footbrake valve. In the event of failure of the service system the secondary system is automatically brought into action to provide reduced but positive braking.

The parking brake operates on the rear brakes by means of a cable and rods from a lever mounted by the driver's seat.

Provision is made in the condensing reservoir for the attachment of an independent air supply should it become necessary to charge the air system while the engine is inoperative. A dual air pressure gauge in the instrument panel indicates the service and secondary reservoir pressures.

The hydraulic brakes are of the leading/trailing shoe type operated by double acting brake cylinders.

220 BRAKE ADJUSTMENT

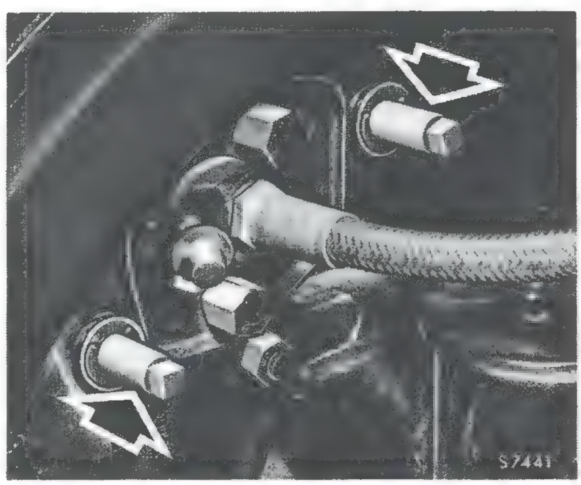
As the master cylinder actuator is operated by air pressure from the footbrake valve, brake shoe travel is not reflected in brake pedal movement. To provide an indication of brake shoe travel a micro switch is incorporated in the actuator to illuminate a warning lamp in the instrument panel when the brakes require adjustment.

Before adjusting the brakes, check, and if necessary, adjust the hub bearings.

Check also for excessive wear of the shoe facings. These can be examined through the inspection holes in each flange plate.

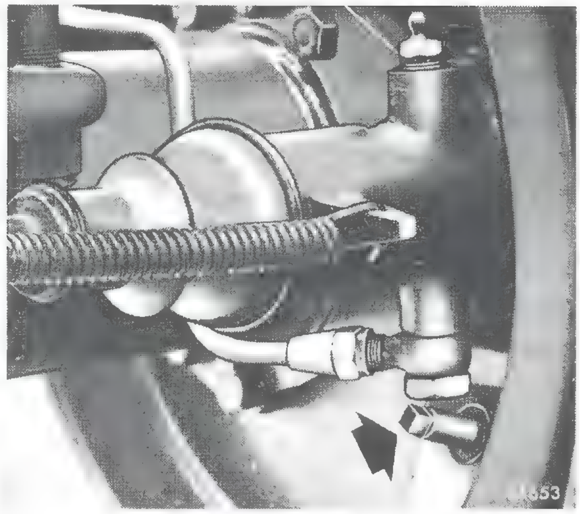
There are two adjusters on each front brake assembly and one adjuster on each rear brake assembly.

To adjust front brakes, fully charge air system, turn adjusters anti-clockwise until drum is free to rotate, then turn front adjuster clockwise until shoe is hard against drum. Centralize shoe by applying heavy pressure to brake pedal then back off adjuster until shoe is just clear of drum. Repeat operation with rear adjuster.



Before adjusting rear brakes, fully charge air system and release parking brake.

Turn adjuster on each brake assembly clockwise until shoes are hard against drum. Centralize shoes by applying heavy pressure to brake pedal then back off adjuster until shoes are just clear of drum.



The parking brake is adjusted automatically with the footbrake adjustment and normally no other adjustment is required. If there is excessive parking brake lever travel after footbrake adjustment has been completed then the parking brake linkage must be adjusted.

221 BLEEDING THE HYDRAULIC SYSTEM

Before bleeding system, fully charge air system, adjust brakes, and release parking brake.

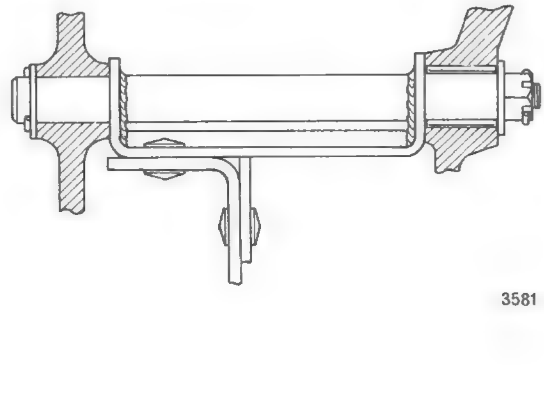
Bleed each brake in sequence left-hand rear, right-hand rear, left-hand front, right-hand front. It is not necessary to fully depress brake pedal during this operation. To ensure master cylinder pistons fully return after each stroke of brake pedal, exhaust diaphragm should be removed from rear of footbrake valve.

After bleeding system, apply heavy pressure to brake pedal and check that warning lamp in instrument panel does not illuminate as this indicates presence of air, leakage in hydraulic system or incorrect brake shoe adjustment.

It is important that exhaust diaphragm is correctly replaced after bleeding operation is complete.

222 BRAKE PEDAL AND LINKAGE

The brake pedal is mounted on bearing rollers and, on right drive vehicles, is supported together with the clutch pedal on a shaft attached to the chassis frame.



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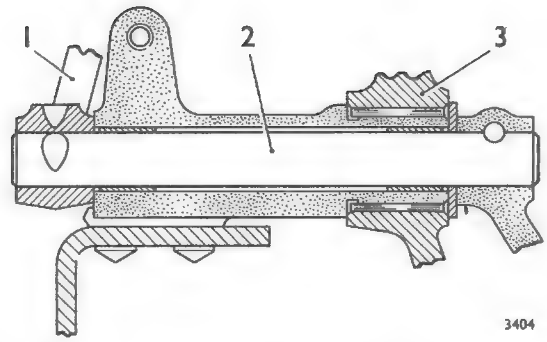
On left drive vehicles the brake pedal (3) pivots on the outside of a bracket which supports the clutch pedal (1) and shaft (2).



A plate carrying an adjustable pedal stop bolt is mounted in front of the pedal.

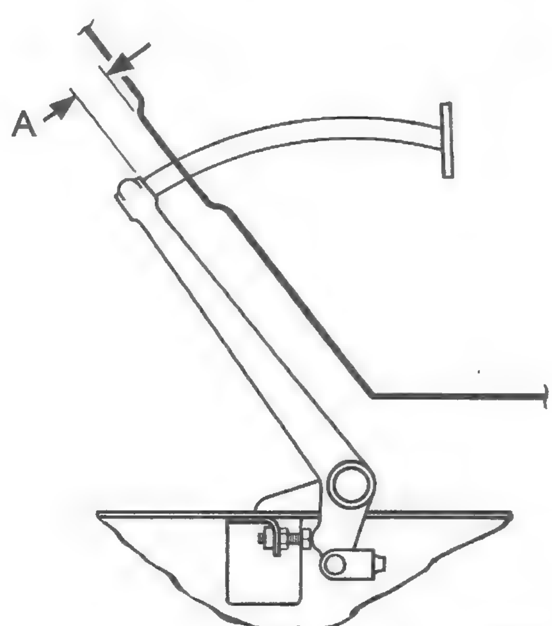
The relay lever on left drive vehicles is supported by a bracket attached to the chassis frame and pivots on a non-metallic bush.

222a BRAKE PEDAL SETTING

It is not usually necessary to alter the brake pedal setting unless the stop bolt has been disturbed or parts of the linkage renewed.

On right drive vehicles adjustment of pedal setting may be achieved by adjusting pedal stop bolt until all free play is just eliminated with footbrake valve in off position. Back off pedal stop bolt half a turn to provide pedal free travel.

On left drive vehicles pedal may be re-set by adjusting pedal stop bolt until dimension 'A' between pedal lever and underside of toe panel is 2.10 in. With pedal held against stop bolt and footbrake valve in off position adjust length of brake pedal push rod until all free play is just eliminated.



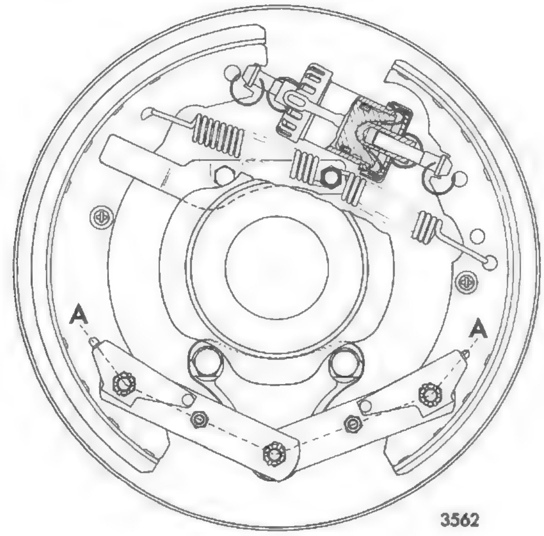
After installing push rod clevis pin, back off stop bolt half a turn to provide pedal free travel.

223 BRAKE DRUMS

Refer to Section 34.

224 FRONT BRAKE SHOES

The front brakes are similar to that described in Section 5 except that each shoe is provided with an individual drum-type adjuster and pull-off spring.



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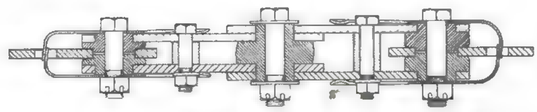


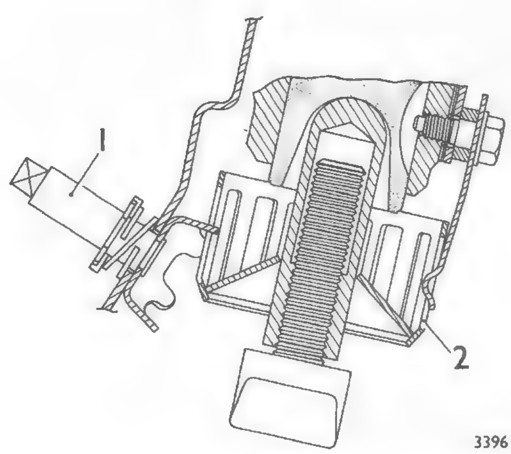
SECTION A-A 3712

When refacing shoes install shorter rivets in eight holes nearest centre of shoe.

When assembling pull-off springs attach squared end to brake shoe and ensure longer spring is attached to D-shaped hole in leading shoe.

225 REAR BRAKE SHOES

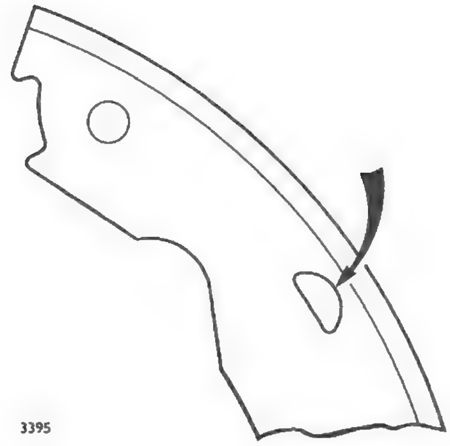
The rear brakes are similar to that described in Section 6 except that the drum-type brake shoe adjusters (2) are actuated by a sprocket attached to a square-headed spindle (1).



3396

When refacing shoes, install shorter rivets in eight holes nearest centre of shoe.

When assembling pull-off springs attach squared end to brake shoe and ensure spring with greater number of coils is attached to D-shaped hole in leading shoe.



3395

226 FRONT BRAKE CYLINDERS

Refer to Section 37.

227 REAR BRAKE CYLINDERS

Refer to Section 8.

228 REAR BRAKE BISECTORS

Refer to Section 9.

229 MASTER CYLINDER

Refer to Section 56.

230 NON-RETURN VALVES

Non-return valves, identical to those described in Section 75, are incorporated in the service and secondary reservoir supply connections and in the air line between the compressor and the condensing reservoir.

When installing line non-return valve, arrow on body must be in direction of condensing reservoir.

231 SAFETY VALVE

Refer to Section 105.

232 STOP LAMP SWITCHES

The stop lamp switches are as described in Section 106 except that they are incorporated in the air lines between the footbrake valve and the dual actuator.

233 LOW AIR PRESSURE WARNING SWITCHES

Low air pressure warning switches are incorporated in the service and secondary reservoirs. The switches, which actuate a buzzer and warning lamp in the vehicle if the pressure in either reservoir falls below the minimum required, are sealed units and consist of a body, spring-loaded diaphragm and contacts.

233a LOW AIR PRESSURE WARNING SWITCHES — Operating Test

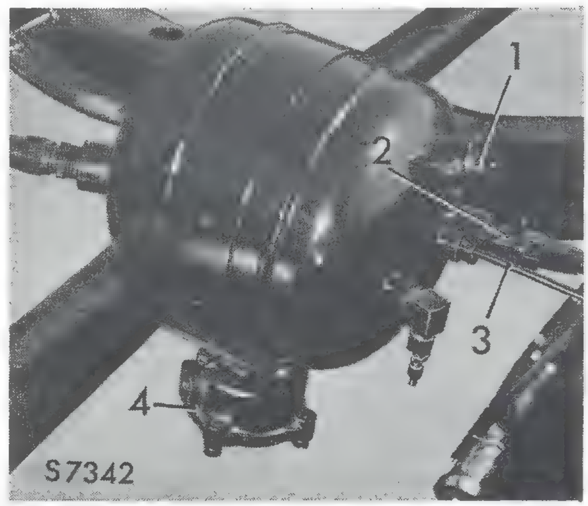
With system fully charged and engine stopped, disconnect wire from switch not being tested and turn key-start switch to running position. Release pressure by applying and releasing footbrake and note pressure indicated on dual gauge at which buzzer and warning lamp operate.

If switch fails to operate within specified limits it must be renewed.

234 CONDENSING RESERVOIR

A condensing reservoir, fed by air from the compressor via a non-return valve, is mounted on the chassis crossmember on right drive vehicles and on the chassis sidemember on left drive vehicles.

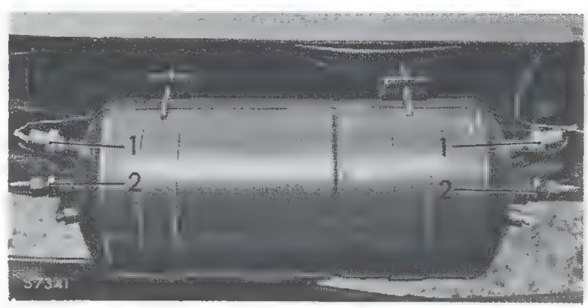
The reservoir is fitted with an automatic water drain valve (4) and a non-adjustable ball-type safety valve (1).



Air lines (2 and 3) supply the dual air reservoir and compressor governor valve respectively.

235 DUAL AIR RESERVOIR

A dual reservoir comprising a service air reservoir and a secondary air reservoir combined in one assembly is mounted on the chassis sidemember. The reservoirs, which are fed with dry air from the condensing reservoir via non-return valves (2), incorporate low pressure warning switches (1) which actuate a buzzer and a warning lamp inside the vehicle if the air pressure in either falls below the minimum required. An air line from each reservoir supplies air to the footbrake valve and the reservoirs are provided with drain plugs.



236 AUTOMATIC DRAIN VALVE

Refer to Section 110.

237 COMPRESSOR GOVERNOR VALVE

The compressor governor valve is similar to that described in Section 60. The cut-out pressure may be checked on the vehicle dual air pressure gauge.

238 MASTER CYLINDER ACTUATOR

The master cylinder actuator is as described in Section 113 for Model YRQ.

239 FOOTBRAKE VALVE

Refer to Section 114.

240 COMPRESSOR CYLINDER HEAD

Refer to Section 115.

241 COMPRESSOR

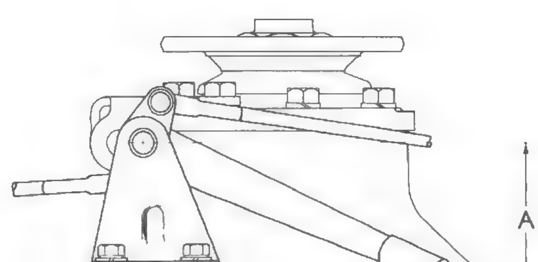
Refer to Section 116.

242 PARKING BRAKE LEVER AND LINKAGE

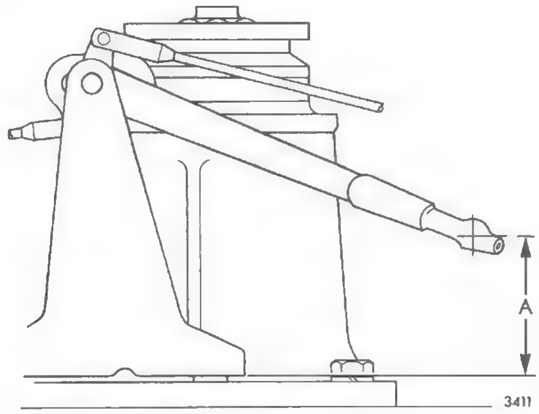
The parking brake lever is bolted to a bracket attached to the chassis crossmember and is connected by a cable to a bell crank lever attached to the rear axle housing. Rods connect the bell crank lever to the rear brake cylinders.

242a PARKING BRAKE LINKAGE — Adjustment

The parking brake is adjusted as described in Section 46a. When setting bell crank lever on single-speed axles, dimension 'A' is 2.22 in.



On two-speed axles dimension 'A' is 4.05 in.



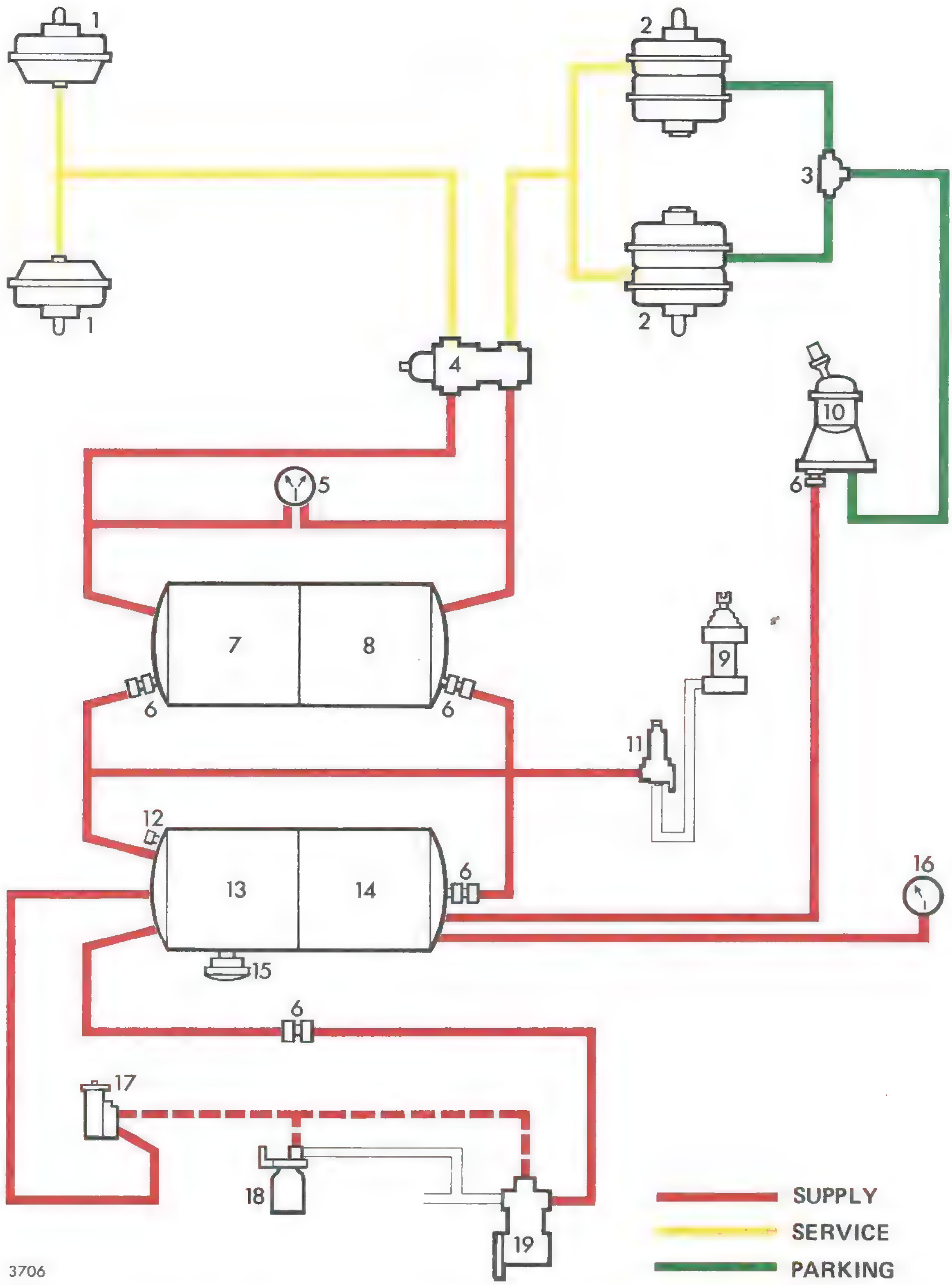
242b PARKING BRAKE LEVER AND CABLE

The parking brake lever and cable are similar to that used with direct-vacuum servo-assisted brakes and the information contained in Section 17b may be applied.

242c BELL CRANK LEVER

Refer to Section 46.

AIR OPERATED SYSTEM WITH SPRING BRAKE ACTUATORS



1. Front brake actuator
2. Rear brake actuator
3. Quick release valve
4. Footbrake valve
5. Dual air pressure gauge
6. Non-return valve
7. Front brake service reservoir
8. Rear brake service reservoir
9. Clutch servo cylinder
10. Parking brake control valve
11. Pressure loss limiting valve
12. Safety valve
13. Condensing reservoir
14. Parking brake reservoir
15. Automatic drain valve
16. Air pressure gauge
17. Governor valve
18. Anti-freeze container
19. Compressor

Schematic diagram of braking system

The air pressure brake system operated by the footbrake valve applies the front brakes by means of single diaphragm actuators and the rear brakes by means of single diaphragm actuators combined with spring brake actuators. The pressure delivered by each half of the footbrake valve are equal, one half controlling the front brakes and the other half the rear brakes.

A parking brake control valve operates the brakes on the rear wheels by means of the spring brake section of the rear actuators. When the parking brake is applied, air is exhausted from the rear actuators and the brakes are held on by spring pressure. Provision is made in the condensing reservoir for the attachment of an independent air supply should it become necessary to move the vehicle while the engine is inoperative.

A dual air pressure gauge in the instrument panel indicates the front and rear brake reservoir pressures. A separate gauge indicates the parking brake reservoir pressure.

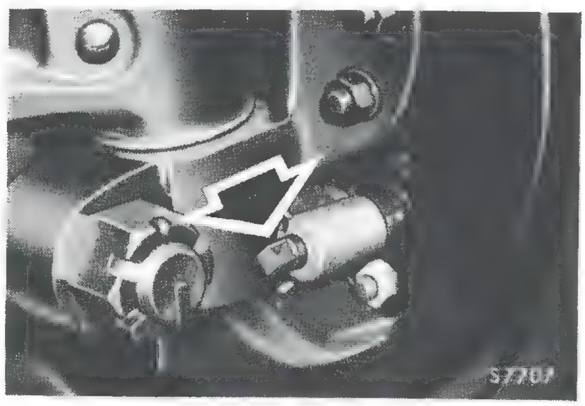
The front and rear brakes are of the Girling two-leading-shoe type operated by wedge and roller expanders.

To prevent air operated auxiliaries affecting the performance of the brake system on coaches, a pressure loss limiting valve is installed in the auxiliary equipment supply air line. Information concerning the pressure loss limiting valve is included in Section 142.

243 BRAKE ADJUSTMENT

Before adjusting the brakes, check and if necessary, adjust the hub bearings. Check also for excessive wear of the shoe facings. These can be examined through the inspection holes in each flange plate.

To adjust brakes, turn adjuster on each flange plate clockwise until shoes are hard against drum, then back off adjuster until shoes are just clear of drum.



Before adjusting rear brakes, fully charge air system and release parking brake.

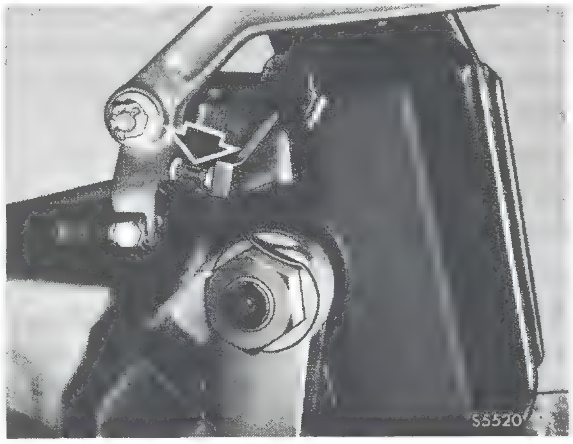
244 BRAKE PEDAL AND LINKAGE

The brake pedal pivots on a shaft mounted on the steering gear and is connected by a push rod and relay lever to the footbrake valve. The pedal and relay lever bushes are of the non-metallic type.

244a BRAKE PEDAL SETTING

It is not usually necessary to alter the brake pedal setting unless the stop bolt has been disturbed or parts of the linkage renewed.

Setting is adjusted by disconnecting push rod from brake pedal lever and adjusting stop bolt until distance between pedal lever and underside of toe panel is 5.10 in.

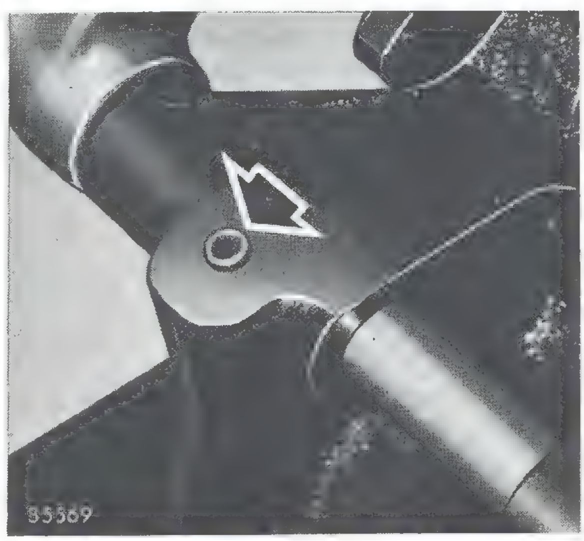


With pedal held against stop and footbrake valve in off position, adjust length of brake pedal push rod until all free play is just eliminated.

After installing push rod clevis pin, back off stop bolt half a turn to provide pedal free travel.

244b BRAKE PEDAL AND LINKAGE – Reconditioning

If required, pedal shaft may be withdrawn from steering gear after removal of spring pin.



Replacement relay lever and pedal bushes are pre-finished and do not require reaming on assembly.

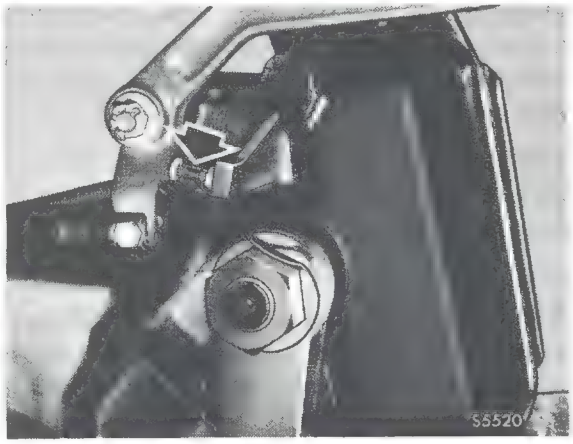
When renewing brake pedal bush, press bush into bore until flush with pedal outer face.

Before assembly, liberally smear bushes with recommended grease.

244a BRAKE PEDAL SETTING

It is not usually necessary to alter the brake pedal setting unless the stop bolt has been disturbed or parts of the linkage renewed.

Setting is adjusted by disconnecting push rod from brake pedal lever and adjusting stop bolt until distance between pedal lever and underside of toe panel is 5.10 in.



With pedal held against stop and footbrake valve in off position, adjust length of brake pedal push rod until all free play is just eliminated.

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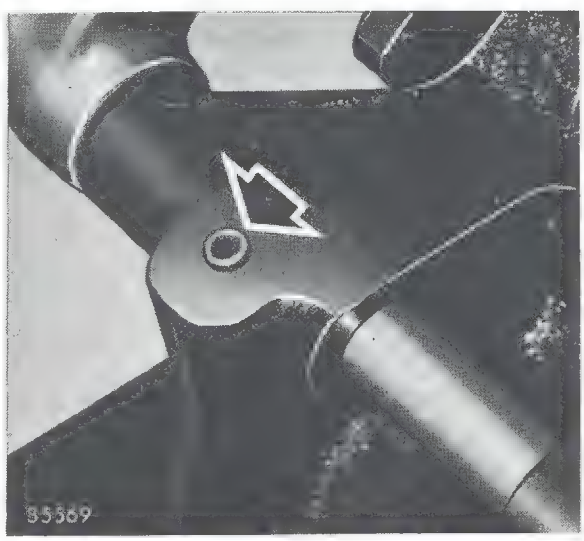
244b BRAKE PEDAL AND LINKAGE – Reconditioning

If required, pedal shaft may be withdrawn from steering gear after removal of spring pin.

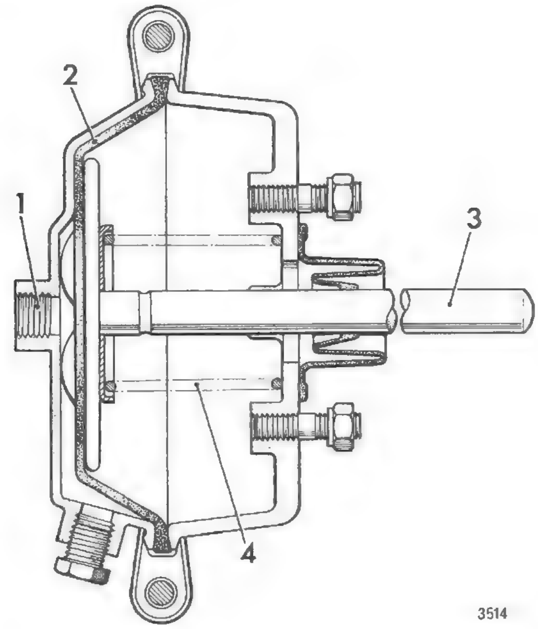


Replacement relay lever and pedal bushes are pre-finished and do not require reaming on assembly.

When renewing brake pedal bush, press bush into bore until flush with pedal outer face.

Before assembly, liberally smear bushes with recommended grease.

When the footbrake is applied air enters the inlet port (1) behind the diaphragm (2) which, together with the push rod (3), moves against the return spring (4) and applies the brakes.



249a FRONT BRAKE ACTUATORS – Leakage Test

Actuators may be checked for leakage by fully charging air system and, with footbrake applied, smearing soap solution over vents in cover.
Leakage indicates a faulty diaphragm.

249b FRONT BRAKE ACTUATORS – Disassembly

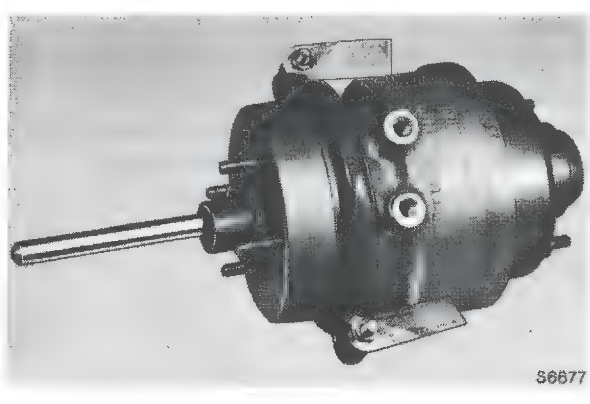
Before removing clamp, mark position of body and cover in relation to clamp to ensure correct reassembly. Spring tension may be overcome by hand pressure.

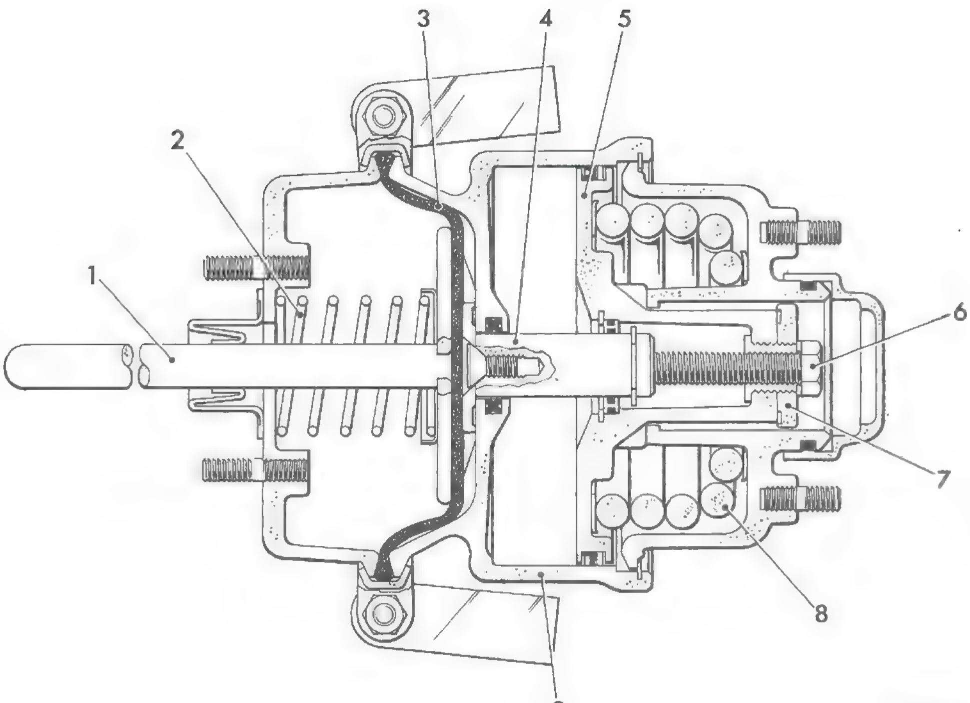
249c FRONT BRAKE ACTUATORS – Reassembly

On reassembly tighten clamp bolts evenly to specified torque and recheck after diaphragm has been allowed to settle.

250 REAR BRAKE ACTUATORS

Each rear brake actuator consists of a single diaphragm actuator combined with a spring brake actuator. The push rod end contains the diaphragm which is controlled by air pressure from the footbrake valve and the remainder of the actuator body contains the spring brake used for parking.





When the footbrake is applied, air enters the supply port behind the diaphragm (3), which, together with the push rod (1), moves against the return spring (2) to apply the brakes.

When the parking brake is applied, air is exhausted from the spring brake actuator body (9) and the spring (8) moves the piston (5), washer (7), release bolt (6) and piston shaft (4) to apply the brakes by means of the push rod.

250a REAR BRAKE ACTUATORS — Leakage Test

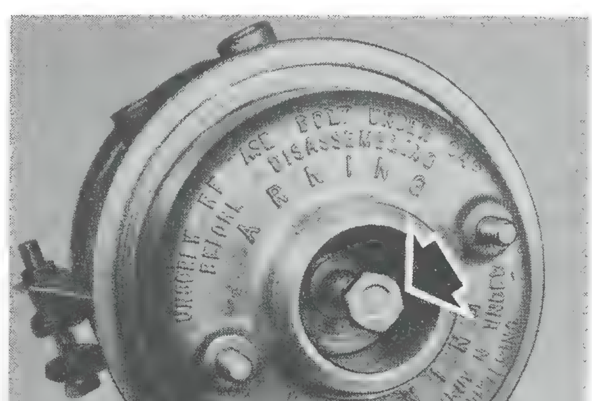
Actuator may be checked for leakage by fully charging air system and releasing parking brake. Leakage from breather in cap indicates a defective piston seal.

Leakage from diaphragm cover or clamp when footbrake is applied indicates a faulty diaphragm.

250b REAR BRAKE ACTUATORS — Removal

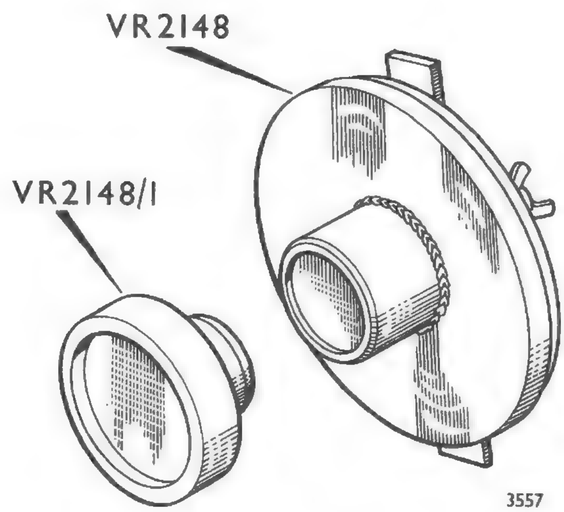
Before withdrawing actuator, apply parking brake, disconnect air lines and remove release bolt (arrowed) which is accessible after removal of end cap.

Removal of release bolt will relieve spring pressure on push rod and facilitate removal of actuator attaching nuts.



No attempt must be made to disassemble the actuators while mounted on the vehicle.

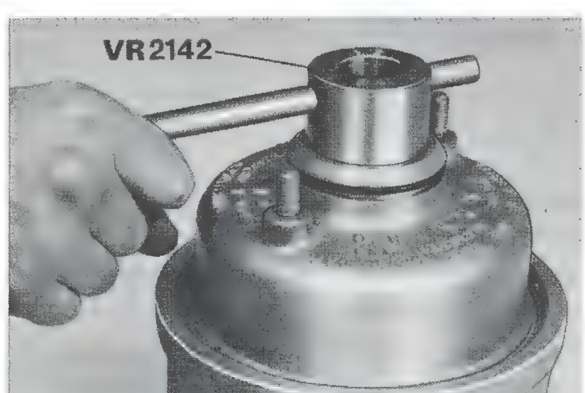
Under no circumstances should any attempt be made to disassemble an actuator without the use of Compressor VR2139 and Adaptors VR2148 and VR2148/1.

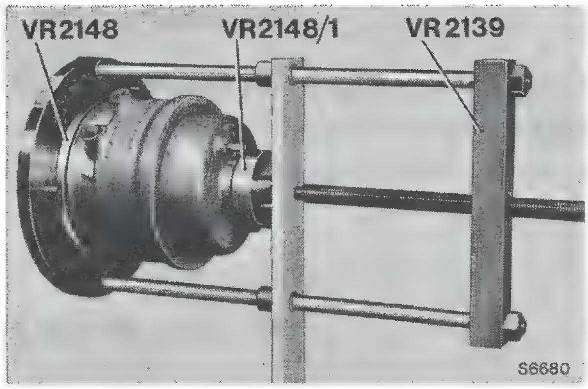


Before disassembly, clearly mark clamp and all joints to provide identification for correct reassembly.

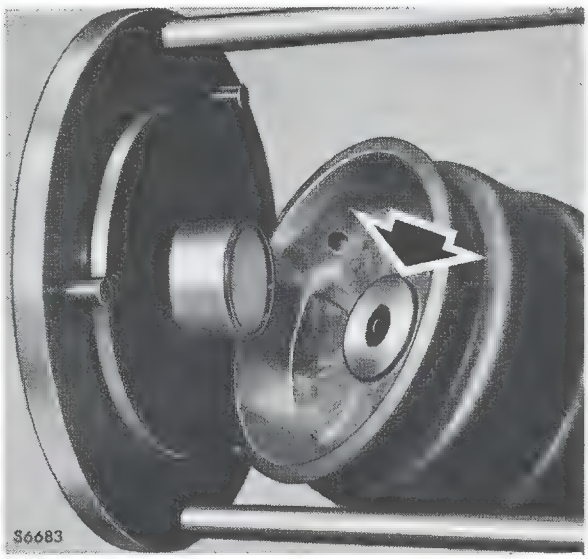
Diaphragm end of actuator can be disassembled by removal of clamp. Spring tension may be overcome by hand pressure.

Remove all sealer covering circlip in actuator body and unscrew washer from end of piston using Wrench VR2142.





With actuator installed in Compressor VR2139 and using Adaptors VR2148 and VR2148/1, pressure of body against circlip can be relieved and circlip removed.



Ensure washer on piston shaft locates in recess of Adaptor VR2148.

Actuator cover must not be compressed into body more than is necessary to remove circlip or damage to body may result.

After removing actuator from compressor, cover, spring and seats may be withdrawn.

Piston and shaft may be separated from body after removal of setscrew and washer from end of piston shaft.

Piston shaft may be withdrawn after removal of circlip and seal retainer.

250d REAR BRAKE ACTUATORS – Inspection

Discard all components which will be renewed from a repair kit.

Slight corrosion in body may be removed with very fine sanding paper.

Sliding surface of piston shaft, and surface of bore in cover must be free from scores and corrosion.

250e REAR BRAKE ACTUATORS – Reassembly

Before reassembly smear all sliding surfaces and seals with grease.

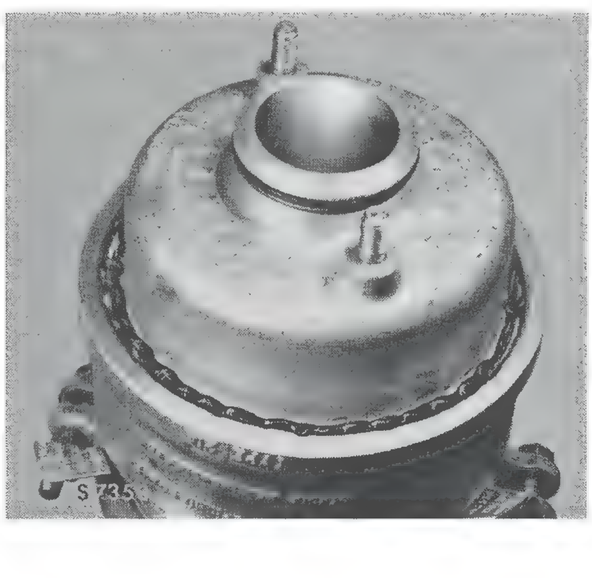
Assemble seal and backing to piston so that open side of seal is adjacent to flat side of piston.

To prevent damage to seal in actuator body when installing piston and shaft, screw Installer VR2149 into end of shaft. Installer and shaft can then be drawn through seal using a rod inserted through hole in end of installer.

Before assembling body, piston, spring and cover into compressor, ensure spring seats are correctly located and circlip groove in body is clean and free from damage. Ensure identification marks are correctly aligned before compressing spring.

Before releasing compressor, closely examine circlip to ensure that it is correctly and positively located.

After fully tightening washer on piston, seal body to cover joint with Bostik 772. Actuator must remain with circlip groove uppermost while sealer hardens.



When installing clamp tighten bolts evenly to specified torque and recheck after diaphragm has been allowed to settle.

250f REAR BRAKE ACTUATORS – Installation

After installing actuator, fully charge air system and move parking brake control valve lever to 'OFF' or 'RELEASE' position before installing and tightening release bolt to specified torque.

Install cap with slot in breather facing downwards.

251 NON-RETURN VALVES

Non-return valves, identical to those described in Section 75, are incorporated in the parking brake, front brake and rear brake reservoirs at the reservoir supply connections, and in the air line between the compressor and the condensing reservoir. A non-return valve is also incorporated in the air line between the parking brake reservoir and the parking brake control valve.

When checking non-return valve attached to parking brake control valve for leakage, fully charge system, release parking brake and exhaust air from parking brake reservoir by means of drain plug before disconnecting supply pipe from valve.

When installing non-return valve in compressor delivery air line, arrow on body must be in direction of condensing reservoir.

252 SAFETY VALVE

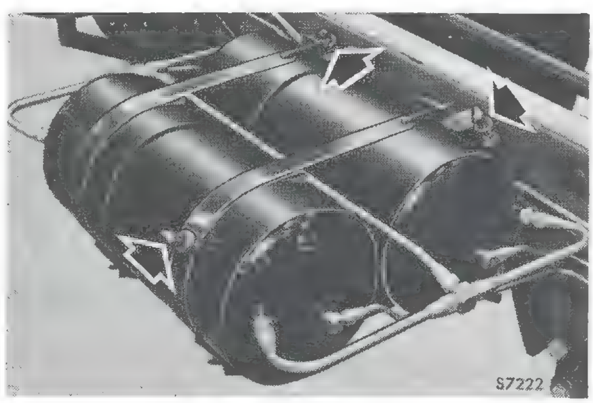
Refer to Section 105.

253 STOP LAMP SWITCHES

Stop lamp switches, similar to those described in Section 106, are incorporated in the air lines from the footbrake valve to the front and rear actuators.

254 LOW AIR PRESSURE WARNING SWITCHES

Low air pressure warning switches are incorporated in the front and rear brake reservoirs and the parking brake reservoir. The switches, which actuate a buzzer and warning lamp in the vehicle if the pressure in the reservoir falls below the minimum required, are sealed units and consist of a body, spring-loaded diaphragm and contacts.



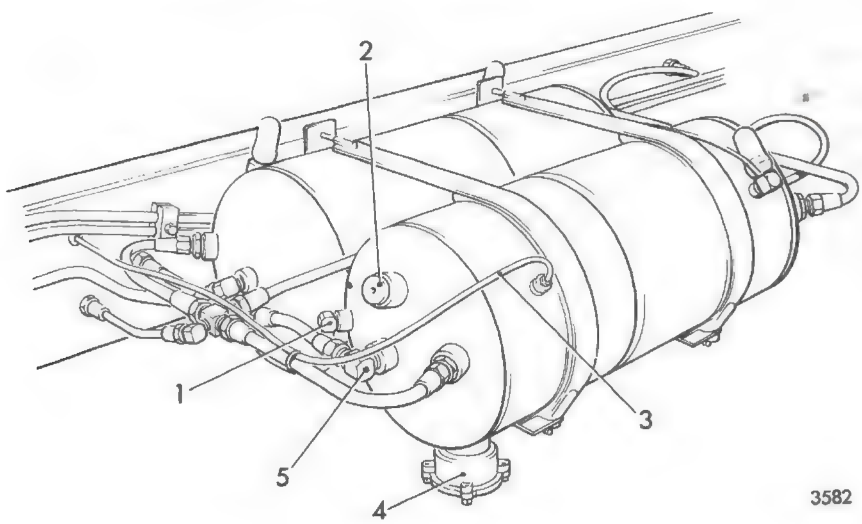
254a LOW AIR PRESSURE WARNING SWITCHES – Operating Test

Operation of front or rear brake reservoir switch may be checked by disconnecting wires from switches not being tested and fully charging system. With engine stopped and key-start switch in running position, release pressure by applying and releasing footbrake and note pressure indicated on dual gauge at which buzzer and warning lamp operate.

Operation of parking brake reservoir switch may be checked by disconnecting wires from switches not being tested and releasing pressure by applying and releasing parking brake. Note pressure on parking brake reservoir gauge at which buzzer and warning lamp operate.

If any of the switches fail to operate within specified limits it must be renewed.

255 DUAL AIR RESERVOIRS



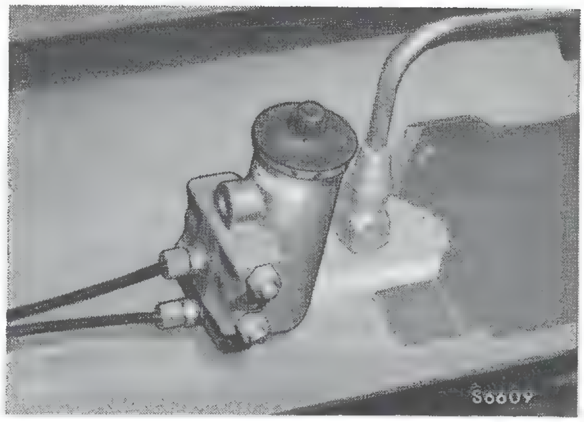
The air pressure supply is contained in two dual air reservoirs mounted together on the outside of the chassis sidemember. The rear half of the outer reservoir acts as a condensing reservoir and is equipped with a safety valve (2), automatic drain valve (4) and an independent air supply connection (1). The reservoir is provided with an air supply (5) from the compressor and an air line (3) to the compressor governor valve.

Dry air from the condensing reservoir is fed via non-return valves to the parking brake reservoir in the front half of the outer reservoir and to the front and rear brake reservoirs which are incorporated in the inner reservoir. These reservoirs incorporate low pressure warning switches which actuate a buzzer and a warning lamp inside the vehicle if the air pressure falls below the minimum required. The reservoirs are provided with drain plugs.

256 AUTOMATIC DRAIN VALVE

Refer to Section 110.

257 COMPRESSOR GOVERNOR VALVE

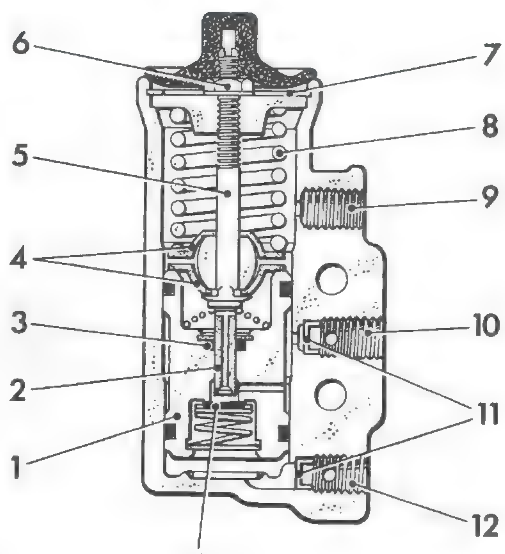


The output of the compressor is controlled by a piston-type governor valve mounted on the chassis sidemember.

The valve comprises a body containing a piston (1), spring (8), inlet/exhaust valve (13), exhaust stem (2) and seal (3) and an adjusting screw (5), with locknut (6), retained by a circlip (7).

Compressed air from the condensing reservoir enters the lower port (12) causing the piston to rise against the spring pressure until the inlet/exhaust valve contacts the exhaust stem. Further movement of the piston causes the inlet valve seat in the piston to move away from the inlet/exhaust valve allowing air to pass through the unloader port (10) to operate the compressor unloader valve. The reservoir and unloader ports incorporate gauge filters (11).

As the air pressure in the reservoir decreases, the spring depresses the piston allowing the inlet valve to seat and the exhaust valve to open. This allows the air in the compressor unloader valve to pass through the hollow exhaust stem and the holes in the spring seats (4) to the exhaust port (9), and normal operation of the compressor is resumed.



2827

257a COMPRESSOR GOVERNOR VALVE – Operating Test

Operation of governor valve may be checked by charging system until valve cuts out and further compression of air ceases. If pressure indicated on vehicle gauge is not within specified limits, slacken locknut under rubber cover and rotate adjusting screw anti-clockwise to increase pressure or clockwise to reduce.


S6700

257b COMPRESSOR GOVERNOR VALVE – Leakage Test

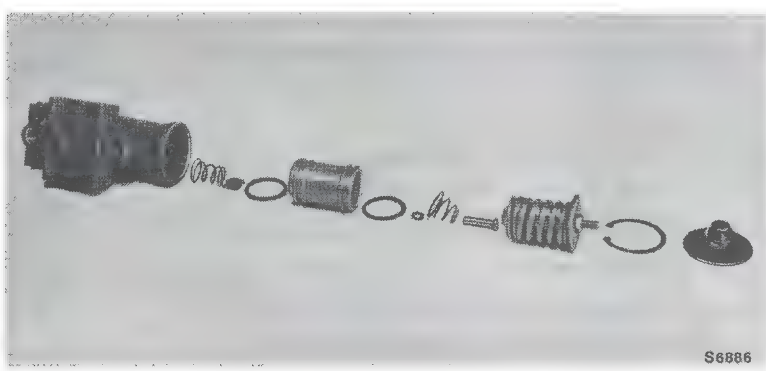
Inlet/exhaust valve and piston seals may be checked for leakage by charging system to just below governor valve cut-out pressure and smearing soap solution over exhaust port.

Fully charge system and again check for leakage from exhaust port. Leakage indicates a faulty inlet/exhaust valve or exhaust stem seal.

257c COMPRESSOR GOVERNOR VALVE – Disassembly and Inspection

Spring assembly and piston assembly can be withdrawn after removal of rubber cover and circlip. Exhaust stem seal may be removed using a thin wire hook.

Discard all components which will be renewed from a repair kit and examine sliding surfaces of body and piston for scores. Ensure drillings in body, piston and exhaust stem are not obstructed.


S6886

257d COMPRESSOR GOVERNOR VALVE – Reassembly and Installation

Before reassembly, liberally smear all sliding surfaces and seals with a molybdenum disulphide based grease.

When installing inlet/exhaust valve, ensure larger coil of spring locates in groove in piston.

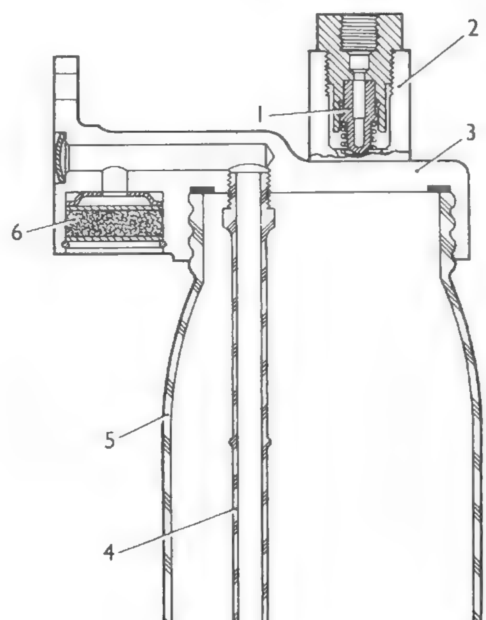

S6699

Install exhaust stem spring so that larger coils contact base of piston bore.

After installing governor valve carry out operating and leakage tests.

258 COMPRESSOR ANTI-FREEZER

To prevent freezing of the moisture in the air drawn into the compressor when the vehicle is operating under low ambient temperature conditions an anti-freezer may be incorporated in the air system. The anti-freezer consists of a reservoir (5) and a cover (3) fitted with an air filter (6), filler plug and check valve (2). Under conditions of low ambient temperature the reservoir is filled with methyl alcohol solution. When the compressor is operating a partial vacuum is present in the compressor manifold and above the methyl alcohol in the anti-freezer reservoir. This causes air to pass through the air filter and tube (4) to the bottom of the reservoir. The air then mixes with the alcohol and the vapour is drawn into the compressor inlet.



2199

When the compressor is unloaded, air from the governor valve causes the plunger (1) in the check valve to close the anti-freezer outlet port and prevent alcohol being supplied to the compressor intake.

258a COMPRESSOR ANTI-FREEZER – Disassembly and Inspection

Check valve may be disassembled by unscrewing hexagonal plunger guide.

Ensure air passages in cover and vent tube are not obstructed.

Inspect plunger and cover sealing rings for deterioration.

258b COMPRESSOR ANTI-FREEZER – Reassembly and Installation

Ensure sealing ring is positioned on plunger before installing plunger in guide.

Install stepped washer, perforated discs and air filter as shown.

Connect air line from governor valve to top port of check valve, and air line from compressor to check valve side port.

259 FOOTBRAKE VALVE

The footbrake valve is similar to that described in Section 114 except that one half of the valve controls the front brakes and the other half the rear brakes.

260 COMPRESSOR CYLINDER HEAD

Refer to Section 115.

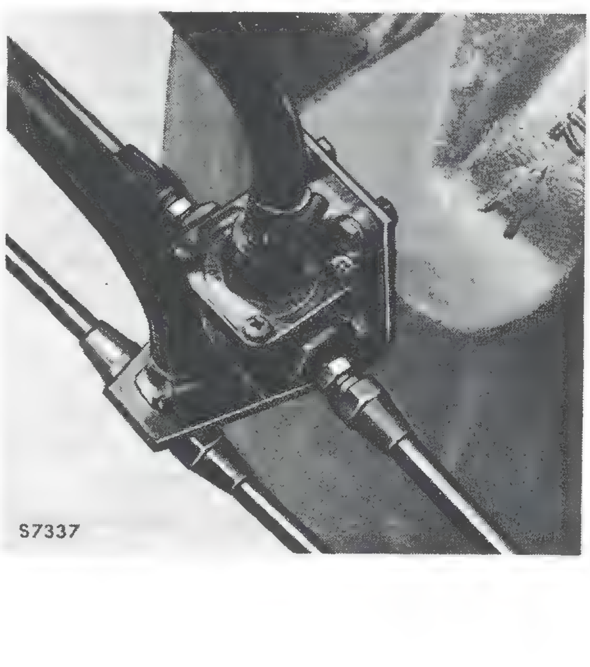
261 COMPRESSOR

Refer to Section 116.

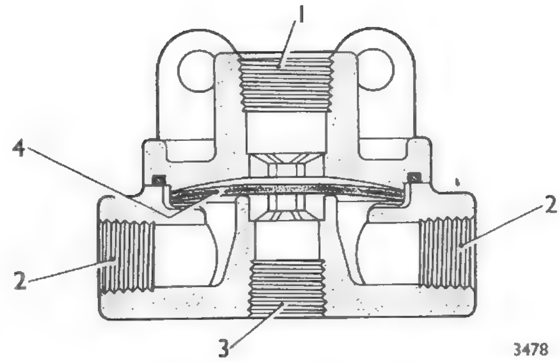
262 QUICK RELEASE VALVE

A quick release valve is incorporated in the air line to the spring brake actuators to reduce the time required to exhaust the air from the actuators when the parking brake is applied.

The valve, which is mounted on the rear axle, consists of a body and cover containing a diaphragm and a sealing ring.



When the parking brake is released, air pressure from the parking brake control valve enters the port (1) in the cover and moves the diaphragm (4) to close the exhaust port (3) in the body. The air pressure then deflects the edge of the diaphragm and passes through the delivery ports (2) to the spring brake actuators.



When the parking brake is applied, the air pressure above the diaphragm is reduced and the pressure in the actuators moves the diaphragm to close the supply port and allows the air to exhaust through the port in the body.

262a QUICK RELEASE VALVE – Operating Test

Valve may be checked for operation by fully charging air system and releasing parking brake. When parking brake is applied air should be exhausted promptly from valve.

262b QUICK RELEASE VALVE – Leakage Test

Valve may be checked for leakage by fully charging air system, releasing parking brake and smearing exhaust port on valve with soap solution.

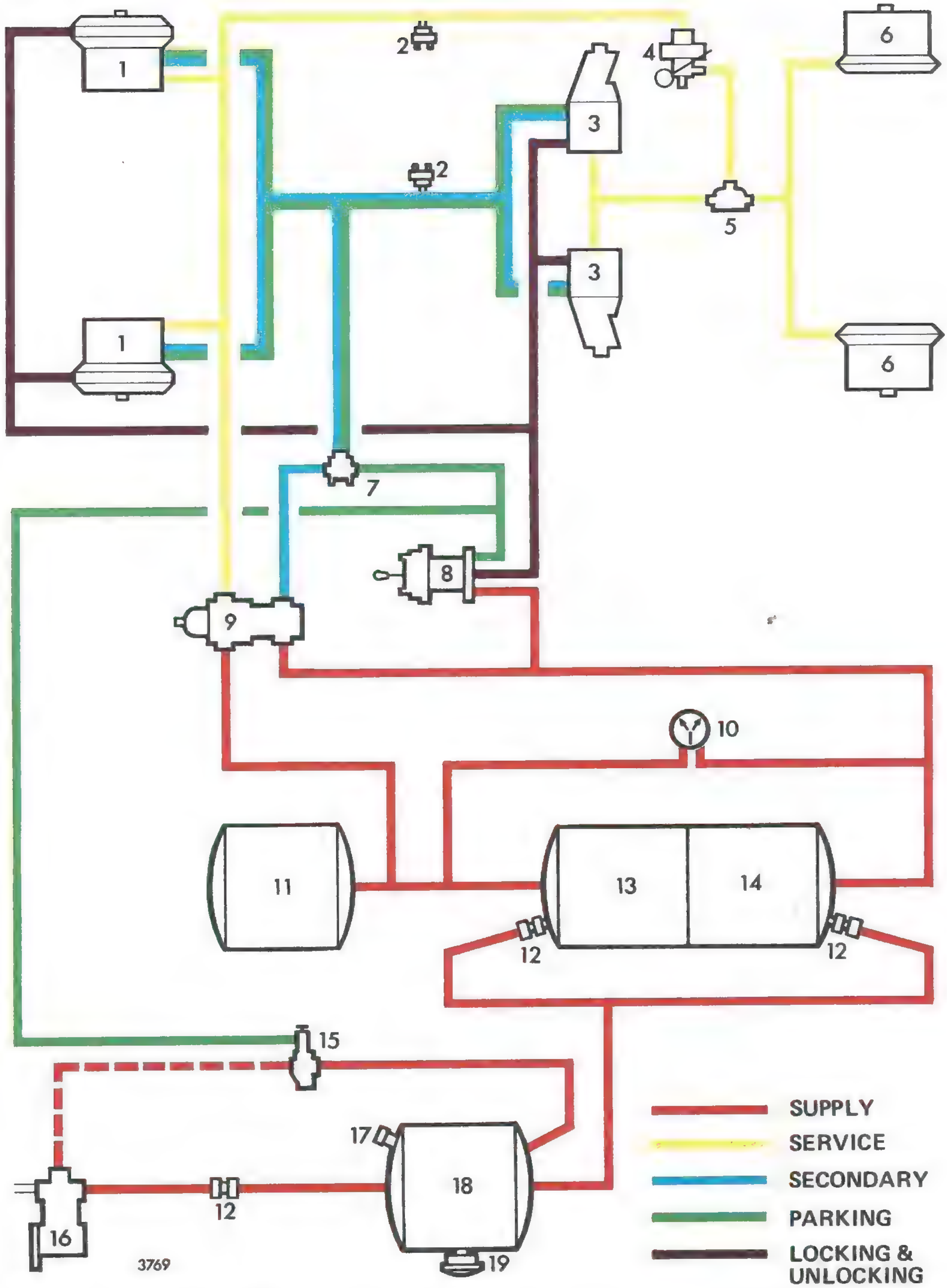
Leakage in excess of a one inch bubble in one second is not permissible.

Valve may be disassembled by removing cover screws.

263 PARKING BRAKE CONTROL VALVE

Information concerning the parking brake control valve contained in Sections 87 and 88, applies, except that the valve is supplied with air from the parking brake reservoir.

DUAL AIR OPERATED SYSTEM WITH TRAILING AXLE BRAKES



1. Front brake actuator
2. Stop lamp switch
3. Driving axle brake actuator
4. Load sensing valve
5. Quick release valve
6. Trailing axle brake actuator
7. Change-over valve
8. Parking brake control valve
9. Footbrake valve
10. Dual air pressure gauge
11. Supplementary service reservoir
12. Non-return valve
13. Service reservoir
14. Secondary reservoir
15. Governor valve
16. Compressor
17. Safety valve
18 Condensing reservoir
19. Automatic drain valve

Schematic diagram of braking system

The air pressure brake system operated by the footbrake valve, applies the front brakes by means of piston/diaphragm lock actuators and the driving axle brakes by means of dual piston lever lock actuators. The trailing axle brakes are applied by means of single diaphragm actuators. The service and secondary air pressures delivered by the footbrake valve are not equal and the front and driving axle actuators normally respond to the service pressure which is the greater of the two. The trailing axle actuators respond to service air pressure only. In the event of failure of the service system the secondary system remains operational without loss of braking power on the front and driving axles.

A load sensing valve is incorporated in the service line to the driving and trailing axle brake actuators to vary the air pressure in proportion to the vehicle load. The valve does not differentiate between the driving and trailing axle brakes and with an unladen vehicle the service line air pressure to the rear axles is reduced compared with the pressure to the front axle. On heavy brake application, the secondary line pressure, which is unrestricted and operates on the front and driving axles only, being greater than the reduced service line pressure, effects a greater braking effort on the driving axle, and deters the trailing axle wheels from locking.

A parking brake control valve operates the brakes on the front and driving axles by means of the actuators which incorporate an air pressure controlled lock mechanism for holding the brakes on. Provision is made in the condensing reservoir for the attachment of an independent air supply should it become necessary to move the vehicle while the engine is inoperative.

A dual air pressure gauge in the instrument panel indicates the service and secondary reservoir pressures.

The front, driving and trailing axle brakes are of the two leading shoe type operated by wedge and roller expanders.

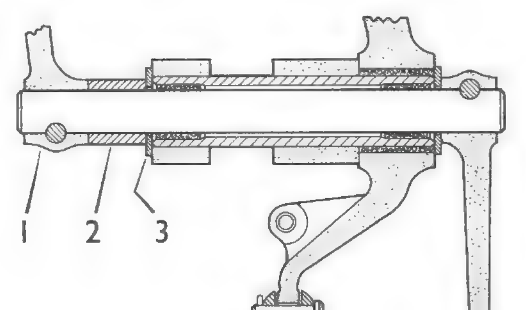
264 BRAKE ADJUSTMENT

Refer to Section 156.

265 BRAKE PEDAL AND LINKAGE

The brake pedal and linkage is similar to that described in Section 20 except that the relay lever pivots on a non-metallic bush and is connected, by a short push rod, to the footbrake valve.

On left drive models a spacer (2) is installed between washer (3) and clutch pedal (1).



The pedal side clearance is not adjustable.

265a BRAKE PEDAL SETTING

Refer to Section 157a.

266 BRAKE DRUMS

Information concerning the brake drums is contained in Section 158. Release parking brake before removing front hub and drum assemblies.

267 BRAKE SHOES

Refer to Section 159.

268 BRAKE ADJUSTERS

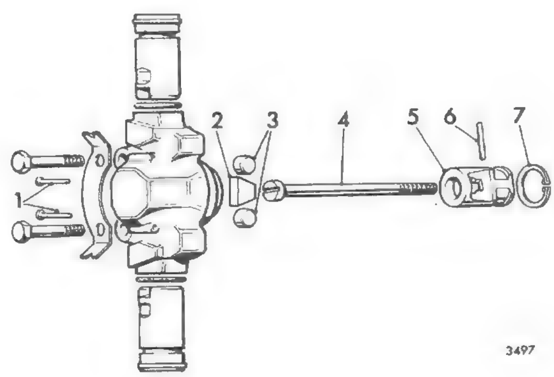
Refer to Section 160.

269 BRAKE EXPANDERS

The brake expanders are similar to those described in Section 161 except that the trailing axle brake expanders are of the 'pull' type.

When disassembling a trailing axle brake expander, plungers may be withdrawn after removal of rivets (1) in expander housing.

Wedge (2), rollers (3) and pull rod (4) may be withdrawn after removal of circlip (7). Pull rod may be separated from link (5) by removing spring pin (6).



270 FRONT BRAKE ACTUATORS

The front brake actuators are similar to those described in Section 183 except that in the event of failure of the service system, air from the footbrake valve enters the secondary/park ports to apply the brakes.

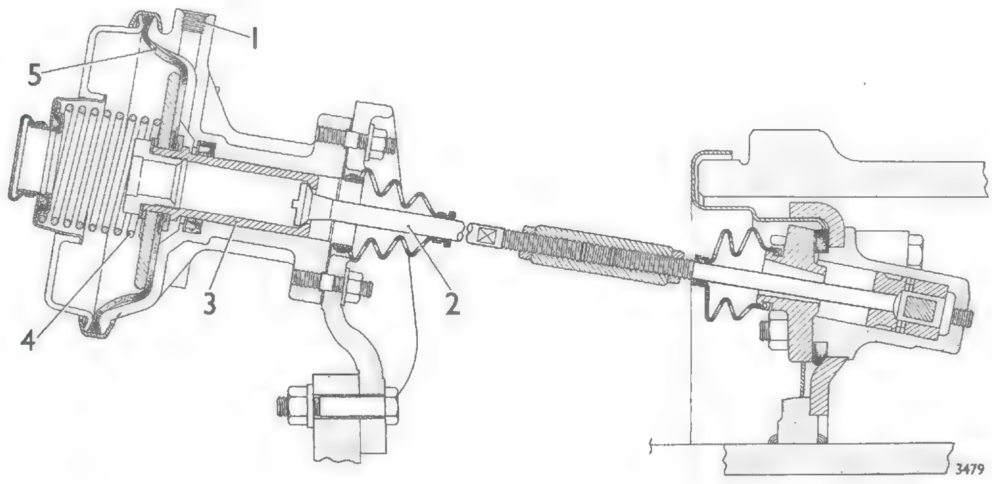
271 REAR BRAKE ACTUATORS

Refer to Section 163.

272 TRAILING AXLE BRAKE ACTUATORS

The trailing axle brake actuators are of the 'pull' type mounted on a support attached to the axle casing. A pull rod extends through the actuator body and is connected to the expander pull rod by a turnbuckle.

When the footbrake is applied air enters the service line port (1) behind the diaphragm (5) which, together with the shaft (3) and pull rod (2), moves against the return spring (4) and applies the brakes.



272a TRAILING AXLE BRAKE ACTUATORS – Leakage Test

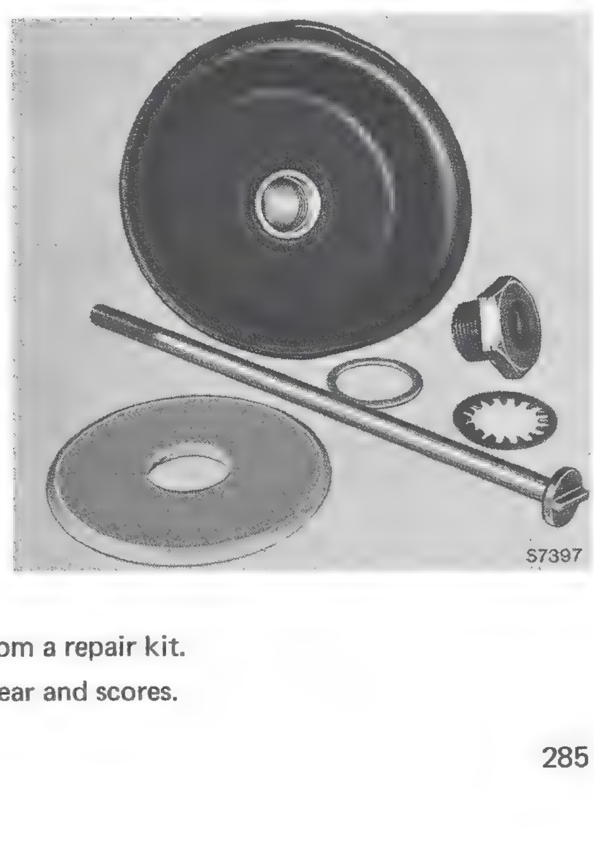
Actuators may be checked for leakage by fully charging air system and, with footbrake applied, smearing soap solution over pull rod gaiter and vent in actuator cover.

Leakage from vent indicates a faulty diaphragm. Leakage from gaiter indicates a defective shaft seal.

272b TRAILING AXLE BRAKE ACTUATORS – Disassembly and Inspection

Before removing clamp, mark position of body in relation to cover. Spring tension may be overcome by hand pressure.

Diaphragm may be separated from shaft after removal of retaining nut and washers.



Discard all components which will be renewed from a repair kit.

Examine sliding surfaces of body and shaft for wear and scores.

272c TRAILING AXLE BRAKE ACTUATORS – Reassembly and Installation

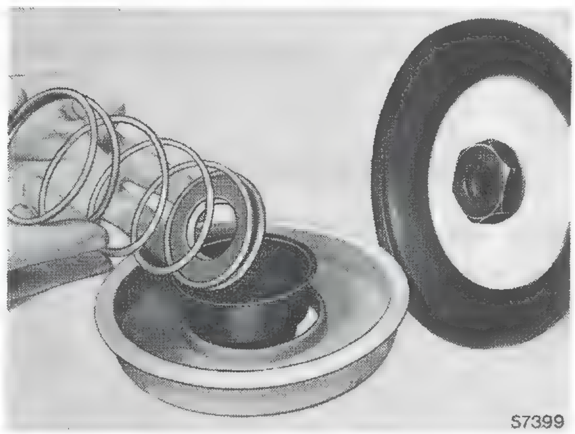
Before reassembly, smear all sliding and load bearing surfaces with recommended grease.

Install seal in body so that open side faces away from mounting studs.

Before assembling diaphragm retaining nut, insert pull rod in shaft and ensure recessed side of diaphragm retaining washer locates over bead in centre of diaphragm.


S7398

Locate breather in end of spring before assembling cover and clamp.


S7399

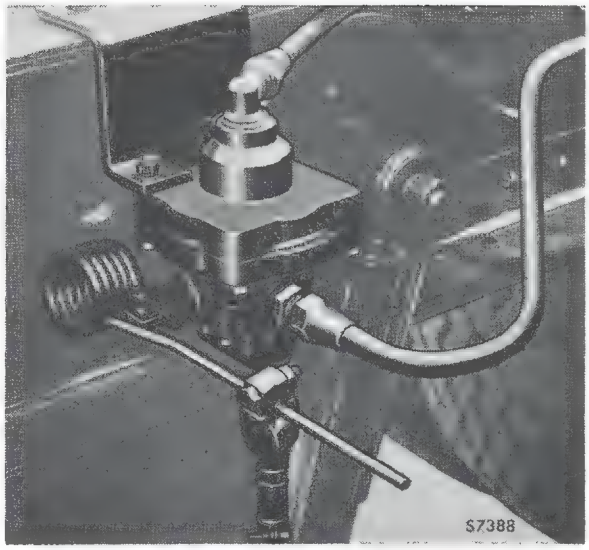
When installing clamp tighten bolts evenly and recheck after diaphragm has been allowed to settle.

After installing actuator, eliminate all free travel in pull rods by adjusting turnbuckle.

273 LOAD SENSING VALVE

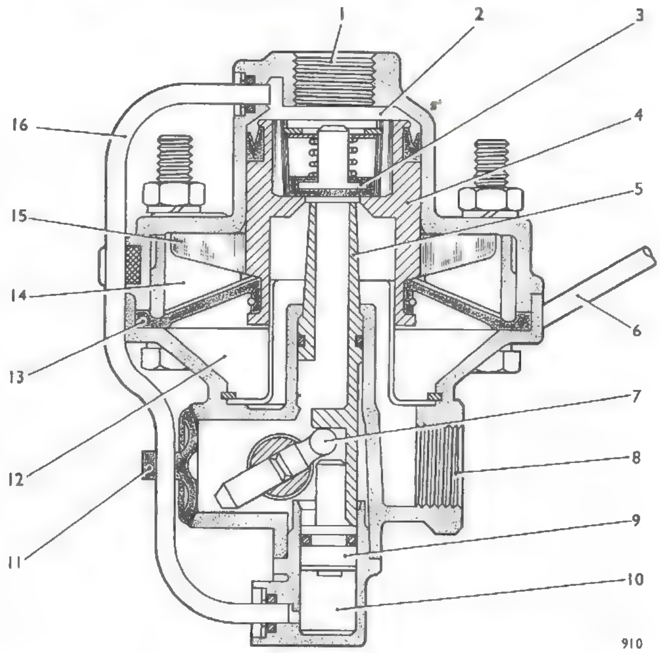
The Westinghouse load sensing valve, incorporated in the service air line to the driving and trailing axle brake actuators, varies the air pressure to the actuators in proportion to the vehicle load.

The valve is mounted on the chassis frame adjacent to the trailing axle, the valve operating lever being connected to the trailing axle by adjustable linkage.



When the vehicle is unladen, the road springs are only slightly deflected and the valve operating lever (6) is in its lowest position. As the load on the vehicle is increased, the lever moves upwards and causes the ball pivot (7) to push the valve stem (5) to its uppermost position just below the valve (3).

When a brake application is made, air at brake line pressure is fed through the supply port (1) into the valve chamber (2), forcing the piston (4) downwards. Simultaneously, air flows through the tube (16) to the chamber (10) below the small piston (9). The piston (9) moves upwards to clamp the ball pivot (7) against the stem (5).



As the valve (3) is supported on the stem (5), it is opened by the downwards movement of the piston (4), allowing air to flow through the delivery port (8) to the brake actuators. At the same time, this pressure is communicated into the chamber (12) to the underside of the diaphragm (13).

The downwards movement of the piston moves the diaphragm away from the fixed support fins (14) attached to the valve body and it is partially supported by the fins (15) attached to the piston. This alters the effective area of the diaphragm until the force under the diaphragm equals that above the piston and the valve (3) is closed. Balance is, therefore, achieved by a lower delivery pressure keeping the valve assembly with both inlet and exhaust valves closed.

As the effective area of the diaphragm depends on the position of the fins attached to the piston, which in turn depends on the position of the ball pivot, the output pressure to the brake actuators will be increased or decreased according to the load on the rear suspension.

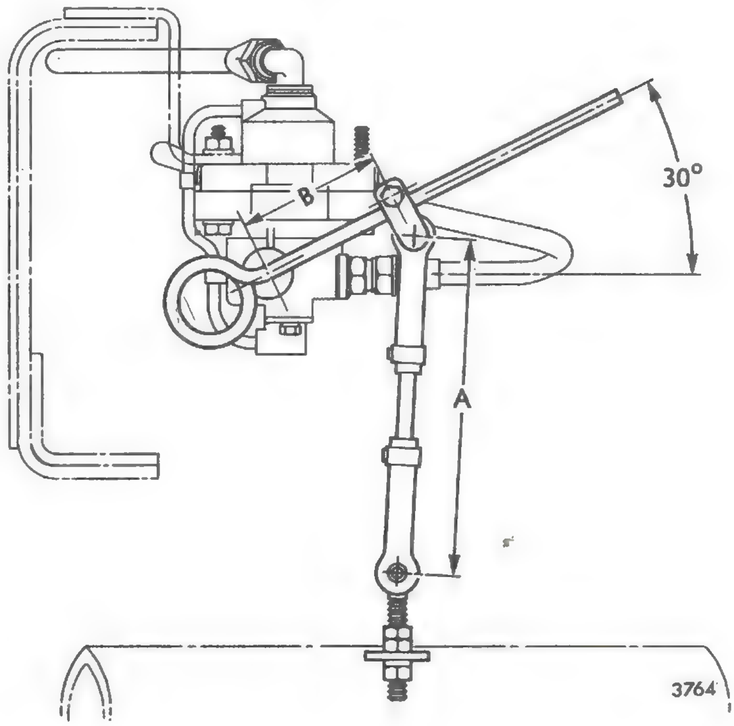
When the brakes are released, the pressure in the line between the load sensing valve and quick release valve will return piston (4) to the upper position, unseating the valve (3) from the stem (5), allowing air to exhaust to atmosphere through the hollow stem and past the exhaust diaphragm (11).

273a LOAD SENSING VALVE — Linkage Adjustment

Adjustment of the linkage must be carried out with the vehicle fully laden.

To adjust linkage, disconnect link from bracket on axle casing and check that dimension 'B' between centre of pivot and centre of clamp bolt is 3.50 in.

After adjusting length of link (dimension 'A') to 7.65 in. insert threaded end of link in bracket on axle casing and adjust nuts until operating lever is 30° above horizontal.



273b LOAD SENSING VALVE -- Operating Test

If operation of valve is suspect after linkage adjustment has been checked, disconnect air line from delivery port of valve and install Gauge VR2047.

After marking position of clamp on operating lever, disconnect clamp and position operating lever in maximum unladen (lowest) position.

With system fully charged and footbrake fully applied, pressure registered on test gauge should be approximately one-third of that registered on vehicle service reservoir gauge.

With footbrake still applied, move valve operating lever to maximum laden (highest) position and check that pressure registered on test gauge rises progressively to approximately equal that registered on service reservoir gauge.

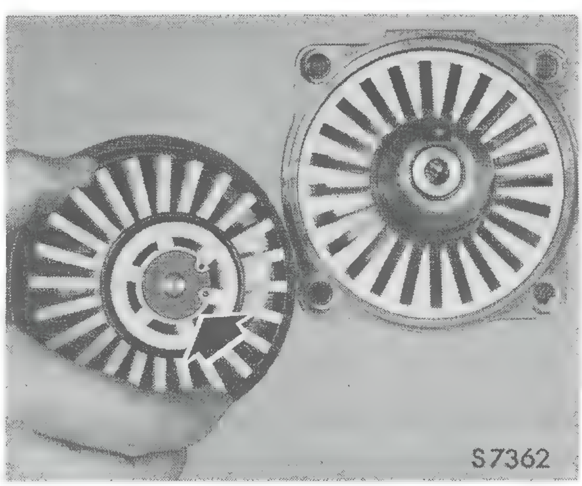
273c LOAD SENSING VALVE — Leakage Test

Valve may be checked for leakage by fully charging system and smearing exhaust diaphragm, body joints and unions with soap solution. With footbrake fully applied, check for leakage with valve operating lever in laden, unladen and midway positions.

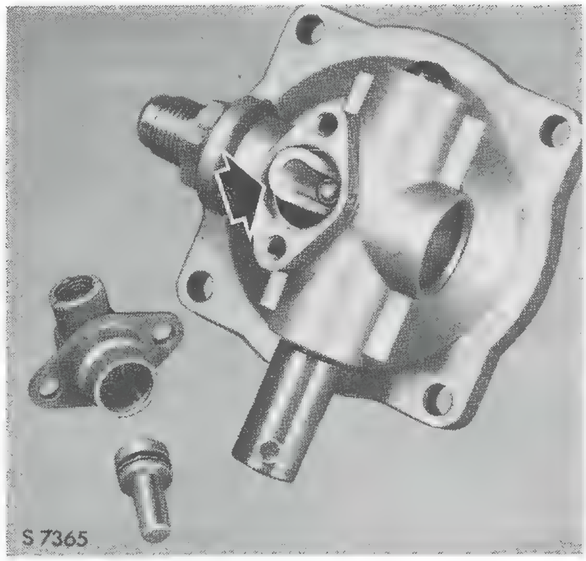
273d LOAD SENSING VALVE — Disassembly

Before removing valve cover, tube secured by clamp and screws must be withdrawn.

Access to circlip retaining inlet/exhaust valve is gained by removing piston and diaphragm assembly from cover.



Small piston and valve stem (arrowed) may be withdrawn after removal of bottom cover.



Piston guide is retained in body by a circlip.

If necessary, shaft may be withdrawn from body after removal of ball pivot. Pivot is secured by a screw (arrowed) which is accessible after prising plug out of end of shaft.

Air tube seals in covers are retained by staking.

273e LOAD SENSING VALVE – Inspection

Renew all seals whenever valve is disassembled.

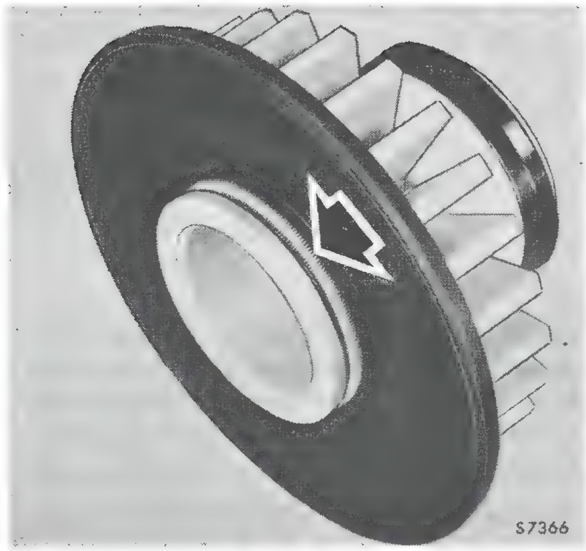
Inspect valve spring and diaphragm for signs of deterioration.

273f LOAD SENSING VALVE – Reassembly

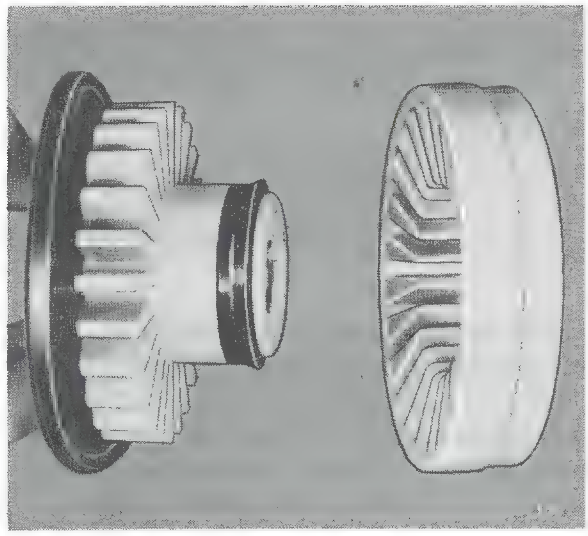
Install new shaft seals so that open side of seals are towards outside of body.

When assembling ball pivot to shaft, apply Loctite Grade CV to retaining screw.

Attach diaphragm to piston so that garter spring is adjacent to end of piston.



When assembling fixed support fins to piston, ensure sloping side of fins face towards diaphragm.



Open side of piston seal faces towards end of piston.

274 NON-RETURN VALVES

Non-return valves, identical to those described in Section 75, are incorporated in the service and secondary dual air reservoir supply connections and in the air line between the compressor and the condensing reservoir. A non-return valve is not included in the air line to the parking brake control valve.

When installing line non-return valve, arrow on body must be in direction of condensing reservoir.

275 SAFETY VALVE

Information concerning the safety valve is contained in Section 105. Operating pressure of valve may be checked on dual air gauge by charging system with parking brake control lever held in 'AUX & UNLOCK' position.

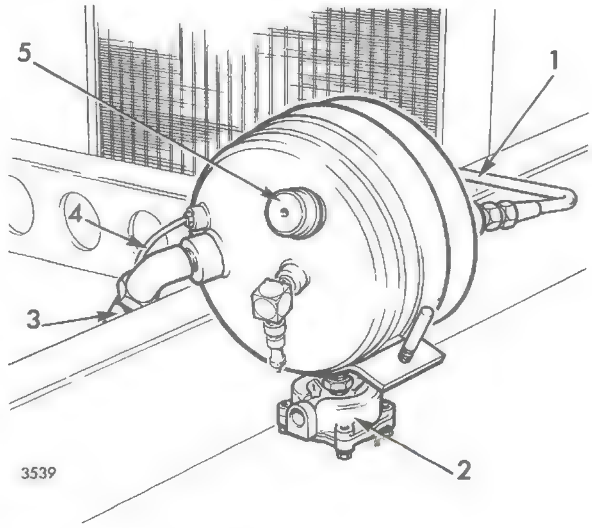
276 STOP LAMP SWITCHES

Stop lamp switches similar to those described in Section 106 are incorporated in the air lines from the footbrake valve to the rear brake actuators.

277 CONDENSING RESERVOIR

A condensing reservoir, fed by air from the compressor via a non-return valve and air line (3), is mounted on the chassis sidemember at the front of the vehicle to ensure maximum air cooling and condensation of water vapour.

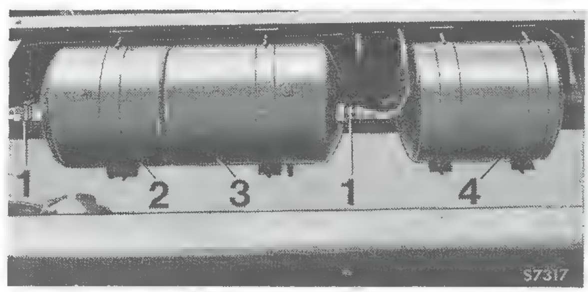
The reservoir is fitted with an automatic water drain valve (2) and a non-adjustable ball-type safety valve (5). Air lines (1 and 4) supply the dual air reservoir and compressor governor valve respectively.



278 DUAL AIR RESERVOIR

A dual reservoir comprising a service air reservoir and a secondary air reservoir combined in one assembly is mounted on the chassis sidemember. The reservoirs, which are fed with dry air from the condensing reservoir via non-return valves (1) supply air to the footbrake valve and the service reservoir (3) also supplies the supplementary service reservoir (4). The secondary reservoir (2) also supplies air to the parking brake control valve.

The reservoirs are provided with drain plugs.



279 SUPPLEMENTARY SERVICE RESERVOIR

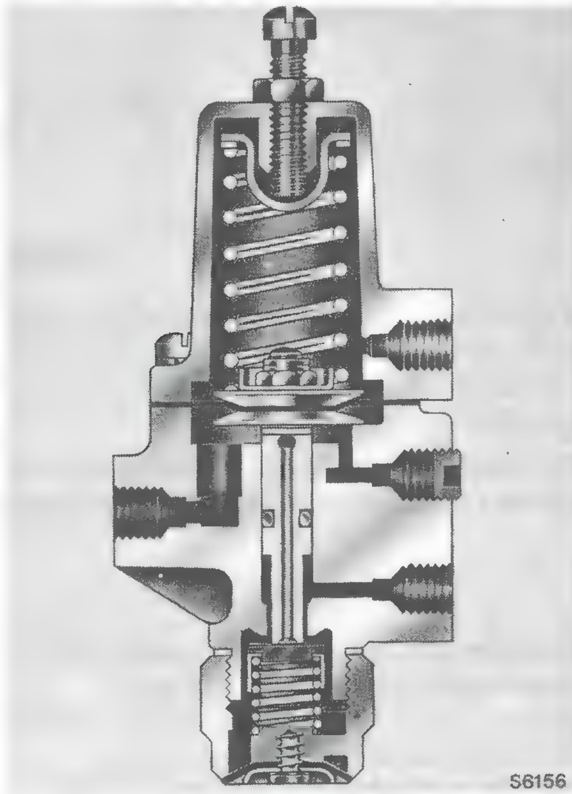
A second service air reservoir, mounted on the chassis sidemember adjacent to the dual air reservoir, supplements the service side of the dual air reservoir.

280 AUTOMATIC DRAIN VALVE

Refer to Section 110.

281 COMPRESSOR GOVERNOR VALVE

The compressor governor valve is similar to that described in Section 60 except that the top cover is sealed and provided with a tapped inlet port. A nylon pipe connects the port to the parking brake control valve delivery air line. When the parking brake control lever is in the 'AUX & UNLOCK' position, air pressure enters the governor valve cover and prevents the valve from cutting-out at the normal operating pressure. If necessary, the system may be charged to the safety valve operating pressure.



The governor valve cut-out pressure may be checked on the vehicle dual air pressure gauge.

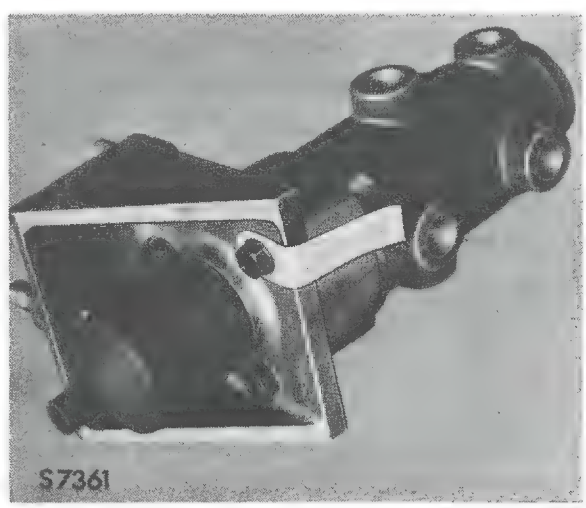
282 COMPRESSOR ANTI-FREEZER

Information concerning the compressor anti-freezer, which may be connected to the compressor intake, is contained in Section 258.

283 FOOTBRAKE VALVE

The footbrake valve is similar to that described in Section 114 except that the front piston return spring is weaker than the rear piston return spring. This differential maintains the service line air pressure to the actuators approximately 1.5 bar (25 lb/sq in.) more than the secondary line pressure until maximum pedal pressure is reached, when the air pressure in both lines is the same.

The valve may be recognised by the type number APGA 6376 stamped on the identification tag attached to the valve.



284 COMPRESSOR CYLINDER HEAD

Refer to Section 115.

285 COMPRESSOR

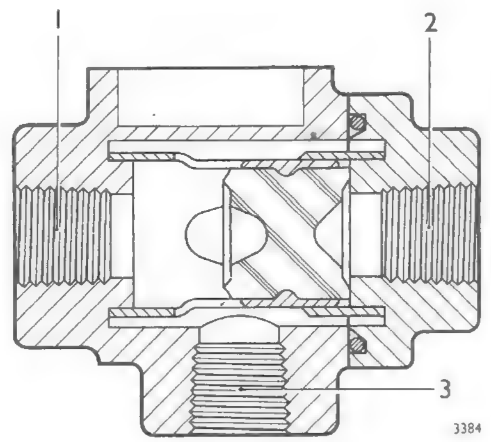
Refer to Section 116.

286 CHANGE-OVER VALVE

A change-over valve is incorporated in the system to prevent loss of air through the parking brake control valve when the footbrake is applied. The valve also prevents loss of air through the footbrake valve when the parking brake control valve lever is moved towards the 'AUX & UNLOCK' position.

The valve consists of a body which has two supply ports and one delivery port. The body contains a shuttle valve which is free to move along a guide.

When the parking brake control valve lever is moved towards the 'AUX & UNLOCK' position, compressed air enters supply port (1) and moves the shuttle valve to the opposite end to seal the other supply port. This allows air to pass through the delivery port (3) to the front and driving axle actuators, and prevents leakage through supply port (2) to the footbrake valve.



286a CHANGE-OVER VALVE – Leakage Test

Leakage at parking brake control valve port of change-over valve may be detected by fully charging system and smearing exhaust aperture at rear of parking brake valve with soap solution. Leakage in excess of a ½in. bubble in five seconds, with the parking brake valve in 'OFF' position and footbrake applied, indicates a faulty shuttle valve.

Leakage from footbrake valve side of change-over valve may be detected by fully charging system and smearing exhaust diaphragm at rear of footbrake valve with soap solution. Leakage in excess of a ½in. bubble in five seconds, with parking brake valve in 'AUX & UNLOCK' position, indicates a faulty shuttle valve.

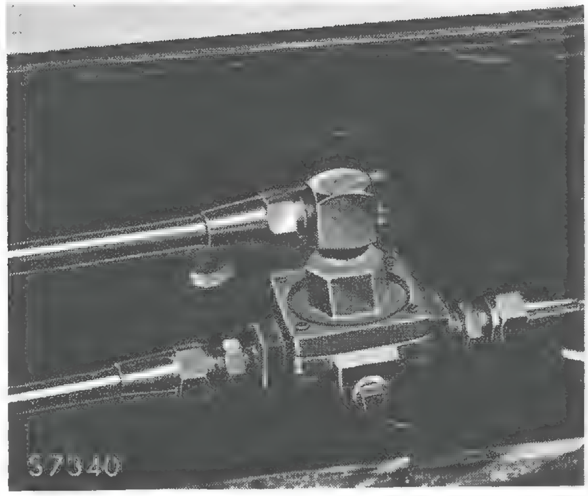
Change-over valve may be disassembled by removing cover.

Before reassembly, smear shuttle valve sleeve and inner surface of guide with recommended grease.

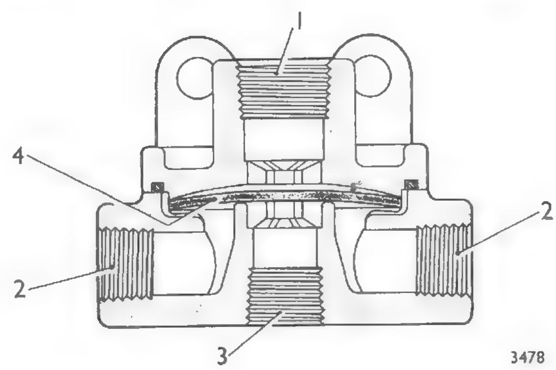
287 QUICK RELEASE VALVE

A quick release valve is incorporated in the service air line to the driving and trailing axle brake actuators to reduce the time required to exhaust the air from the actuators.

The valve, which is mounted on the chassis sidemember adjacent to the driving axle, consists of a body and cover containing a diaphragm and a sealing ring.



When the footbrake is applied, air pressure from the footbrake valve enters the port (1) in the cover and moves the diaphragm to close the exhaust port (3) in the body. The air pressure then deflects the edge of the diaphragm (4) and passes through the delivery ports (2) to the actuators.



When the footbrake is released, the air pressure above the diaphragm is reduced and the pressure in the actuators moves the diaphragm to close the supply port and allows the air to exhaust through the port in the body.

287a QUICK RELEASE VALVE – Operating Test

Valve may be checked for operation by fully charging air system and applying footbrake. When footbrake is released air should be exhausted promptly from valve.

287b QUICK RELEASE VALVE – Leakage Test

Valve may be checked for leakage by fully charging air system, applying footbrake and smearing exhaust port on valve with soap solution.

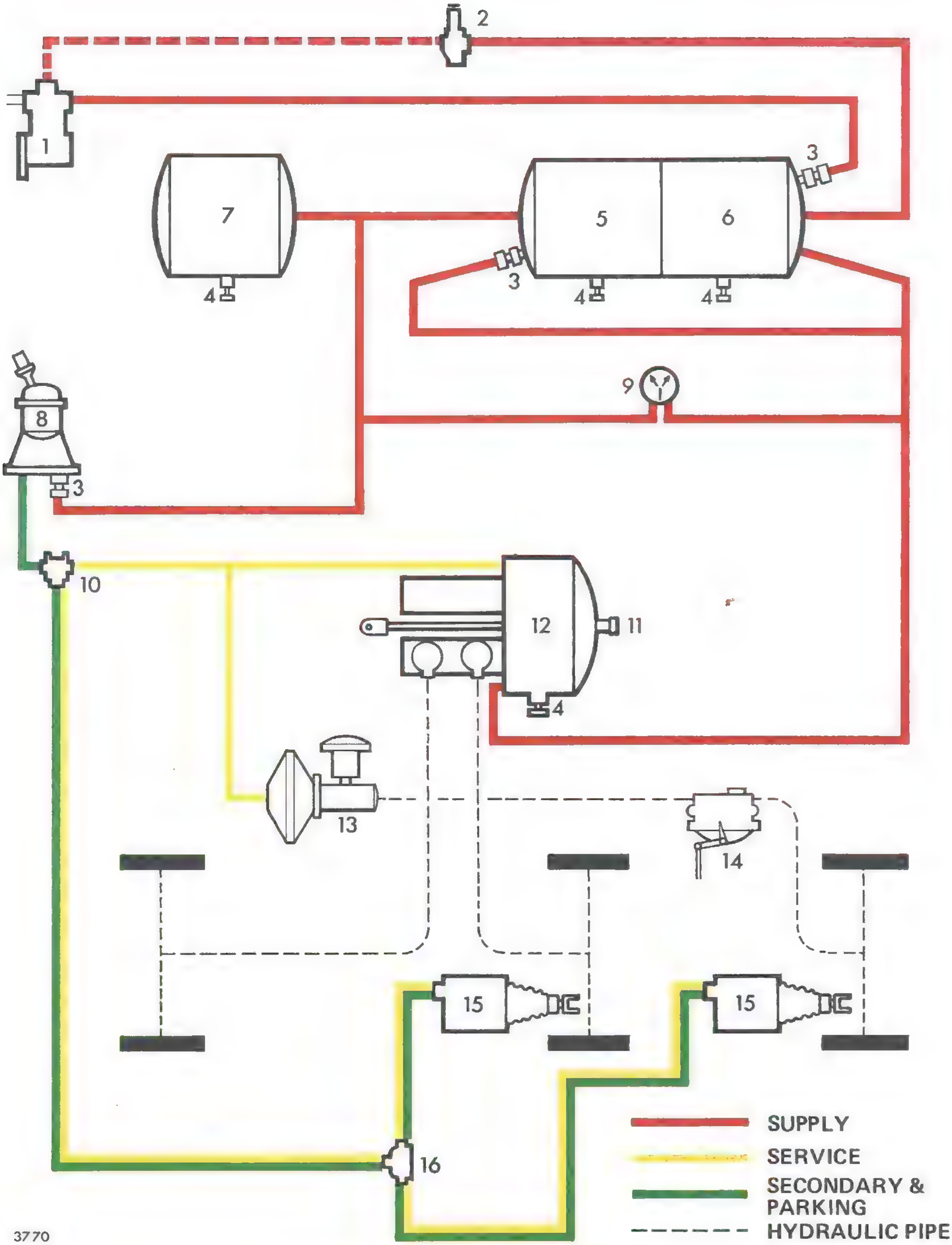
Leakage in excess of a one inch bubble in one second is not permissible.

Valve may be disassembled by removing cover screws.

288 PARKING BRAKE CONTROL VALVE

The parking brake control valve is similar to that described in Section 176 except that the front brake actuator locks and diaphragms are also controlled by the valve.

AIR PRESSURE SERVO-ASSISTED HYDRAULIC SYSTEM WITH TRAILING AXLE BRAKES



1. Compressor
2. Governor valve
3. Non-return valve
4. Drain tap
5. Secondary reservoir
6. Service reservoir
7. Supplementary secondary reservoir
8. Parking brake control valve
9. Dual air pressure gauge
10. Change-over valve
11. Safety valve
12. Servo
13. Slave servo and master cylinder
14. Load sensing valve
15. Spring brake actuator
16. Quick release valve

Schematic diagram of braking system

The service brake, operated by the footbrake pedal, applies the front and driving axle brakes through a hydraulic system assisted by a Clayton Dewandre air pressure servo. The trailing axle brakes are applied by means of a hydraulic system operated by a slave actuator and master cylinder. A load sensing valve is incorporated in the hydraulic line to the trailing axle brakes.

The parking brake control valve operates the brakes on the driving and trailing axles by means of spring brake actuators and mechanical linkage. When the parking brake is applied, air is exhausted from the spring brake actuators via a quick release valve and the brakes are held on by spring pressure. The parking brake system also provides the secondary brake system.

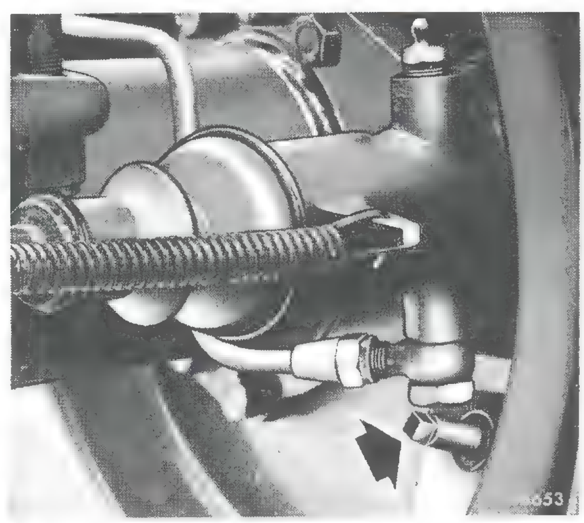
The service reservoir has provision for attachment of an independent air supply should it become necessary to move the vehicle while the engine is inoperative.

The hydraulic brakes are of the leading/trailing shoe type operated by double acting brake cylinders from master cylinders mounted with the servo and slave actuator on the chassis side-member.

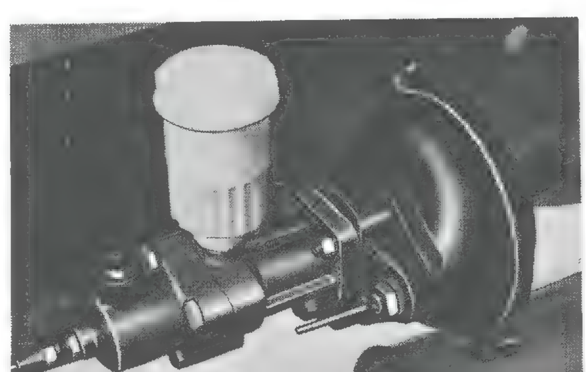
The servo utilises air pressure developed by a single-cylinder engine driven compressor. A compressor governor valve and a safety valve are incorporated in the system.

289 BRAKE ADJUSTMENT

Brake adjustment is as described in Section 31 except that a slotted drum type adjuster actuated by a sprocket attached to a square headed spindle is used on the rear brakes of model EOM. Clockwise rotation of the spindle expands the brake shoes.



As the slave actuator is operated by air pressure from the servo, trailing axle brake shoe travel is not reflected in brake pedal movement. To provide an indication of brake shoe travel an indicator rod is incorporated in the slave actuator. The rod moves out of the actuator to the same extent as the push rod moves to operate the master cylinder, and when the groove on the indicator rod is fully exposed the trailing axle brake shoes require adjustment.



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289 BRAKE ADJUSTMENT (contd)

Before adjusting brakes, fully charge air system and release parking brake. The parking brake is adjusted automatically with the footbrake adjustment and no other adjustment is required except after parts of the brake linkage have been disturbed.

290 BLEEDING THE HYDRAULIC SYSTEM

Before bleeding front and driving axle hydraulic system, fully charge air system, release parking brake and exhaust air from service and servo reservoirs by means of servo drain tap.

Bleed each brake in turn, using rapid full travel strokes of brake pedal, in sequence left-hand rear, right-hand rear, left-hand front, right-hand front.

When bleeding trailing axle hydraulic system, fully charge air system and, with parking brake released, remove all traces of air from slave master cylinder, load sensing valve and finally, brake cylinders.

After bleeding system, push indicator rod into slave actuator until it contacts push rod and apply heavy pressure to brake pedal. Check that indicator rod does not emerge sufficiently to reveal its groove as this indicates presence of air, leakage in hydraulic system or incorrect brake shoe adjustment.

291 BRAKE PEDAL AND LINKAGE

The brake pedal and linkage is similar to that described in Section 20 except that the relay lever is connected to the servo pull rod.

291a BRAKE PEDAL SETTING

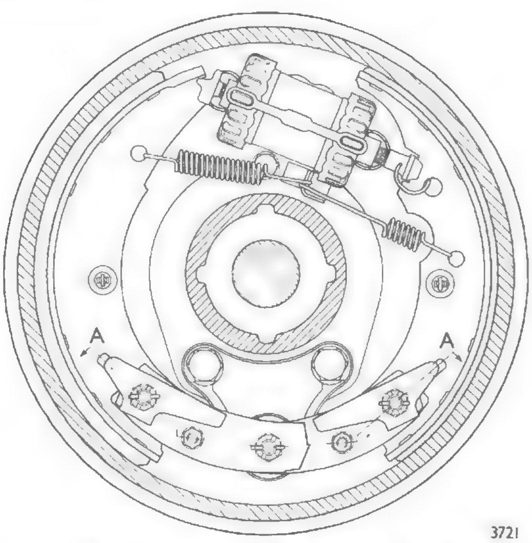
Refer to Section 67a.

292 BRAKE DRUMS

Refer to Section 34.

293 FRONT BRAKE SHOES

The front brakes are similar to those described in Section 5 except that each shoe is provided with a drum-type adjuster and individual pull-off spring.



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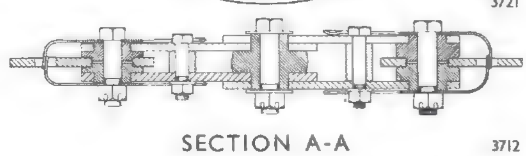


SECTION A-A

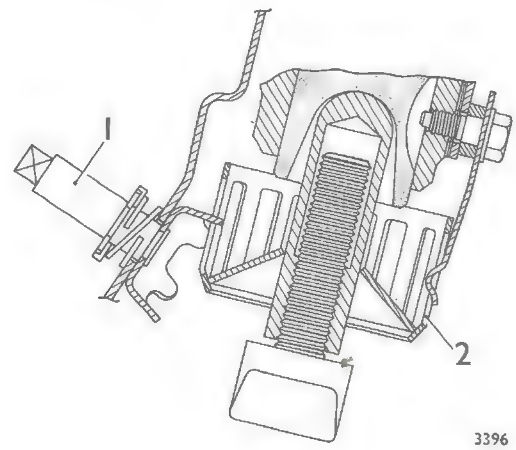
3712

When refacing shoes on Model EJN, install shorter rivets in eight holes nearest centre of shoe.

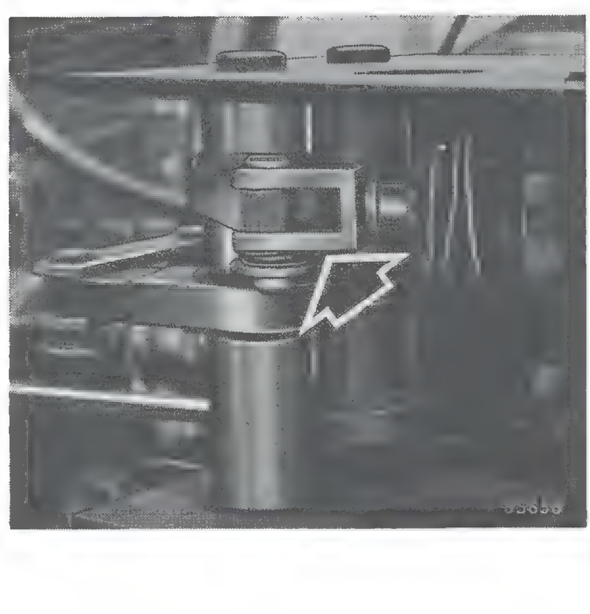
When assembling pull-off springs attach squared end to brake shoe and ensure spring with greater number of coils is attached to leading shoe.

294 REAR BRAKE SHOES

The driving and trailing axle brakes are similar to those described in Section 6 except that drum-type shoe adjusters (2) actuated by a sprocket attached to a square headed spindle (1), are used on Model EJM.

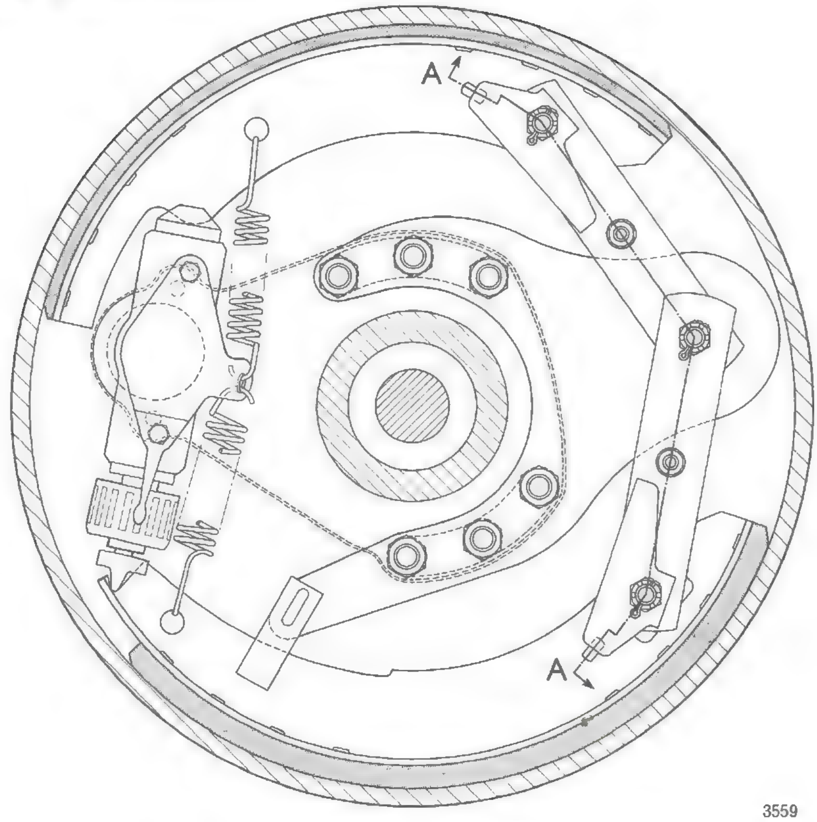


Before removing hub and drum assembly, fully charge air system, release parking brake, and disconnect spring brake actuator clevis from relay lever.



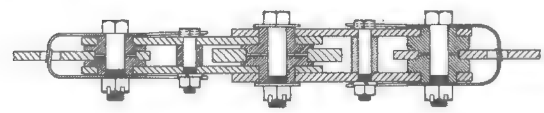
When refacing shoes on Model EJN, install shorter rivets in eight holes nearest centre of shoe.

294 REAR BRAKE SHOES (contd)



When assembling pull-off springs attach squared end to brake shoe and ensure spring with larger coils is attached to leading shoe.

3559



SECTION A-A 3714

295 FRONT BRAKE CYLINDERS

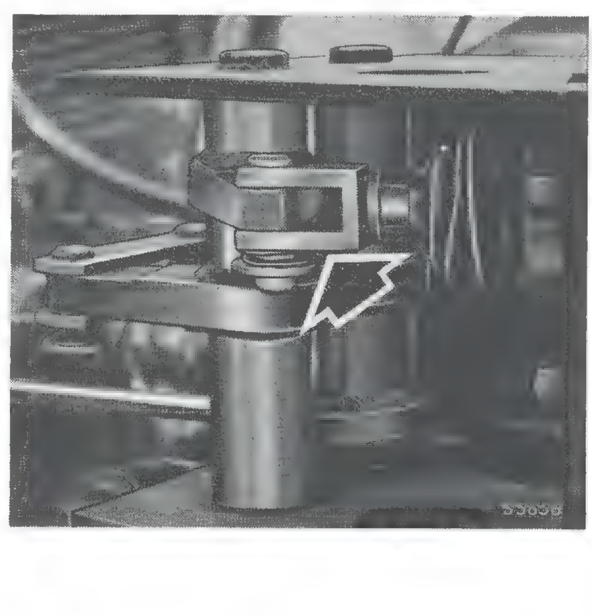
The front brake cylinders are similar to those used with suspended vacuum servo-assisted brakes and the information contained in Section 37 may be applied.

296 REAR BRAKE CYLINDERS

The driving and trailing axle brake cylinders are similar to those used with direct-vacuum servo-assisted brakes and the information contained in Section 8 may be applied.

Before removing rods from bell crank lever, fully charge air system and, with parking brake released, disconnect spring brake actuator clevis from relay lever.

After installing cylinder, adjust length of rods as described under 'Parking Brake Linkage' in Section 86.



297 REAR BRAKE BISECTORS

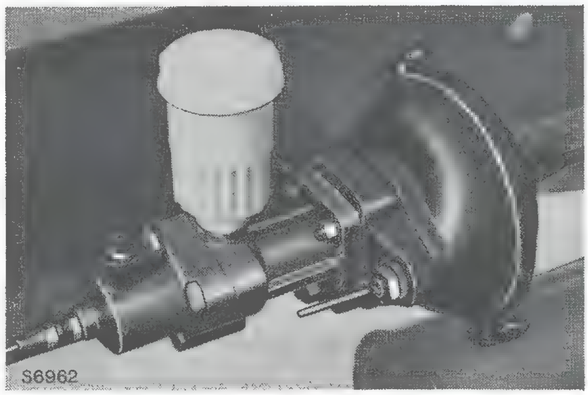
The driving and trailing axle brake bisectors are similar to those used with direct-vacuum servo-assisted brakes and the information contained in Section 9 may be applied except for the differences in brake cylinder removal and installation procedure described in Section 296.

298 MASTER CYLINDER

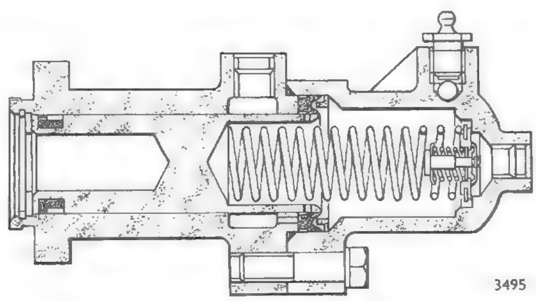
Refer to Section 56.

299 SLAVE MASTER CYLINDER

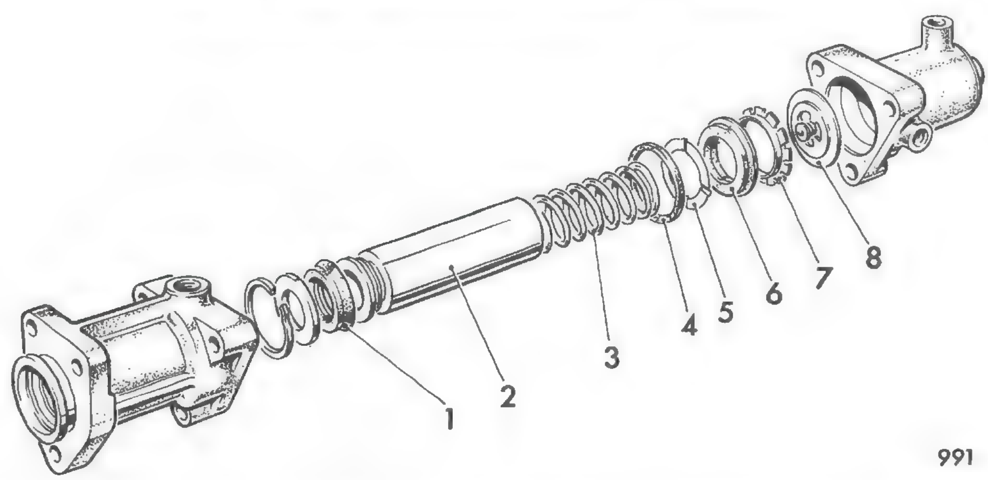
The compression barrel-type slave master cylinder is mounted together with the slave actuator on a support attached to the chassis sidemember.



The cylinder consists of a body and cover containing a spring-loaded piston and check valve assembly. A detachable plastic reservoir is mounted on the cylinder body.



299a SLAVE MASTER CYLINDER – Disassembly



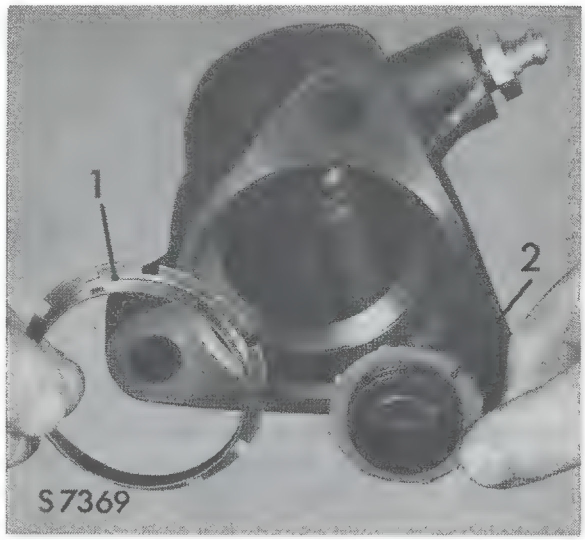
Sealing ring (4), spring (3), shim (5), seal (6), seal support (7) and check valve (8) may be withdrawn after removal of cylinder cover.

Piston (2) and seal (1) may be withdrawn from body after removal of circlip and washer.

Discard all components which will be renewed from a repair kit.

Before reassembly, smear piston and seals with clean brake fluid.

Before installing seal in cover, insert check valve (2) and seal support (1).



Lips of seals on piston and in cover face towards outlet end of cylinder.

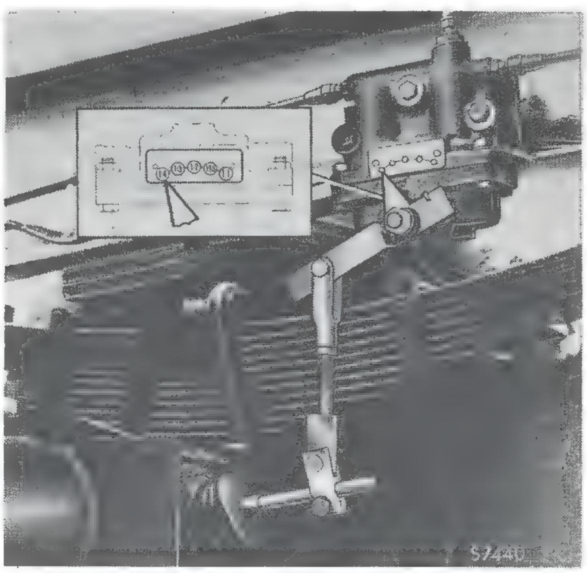
When installing master cylinder, determine thickness of shims required between support and slave actuator as described in Section 308C.

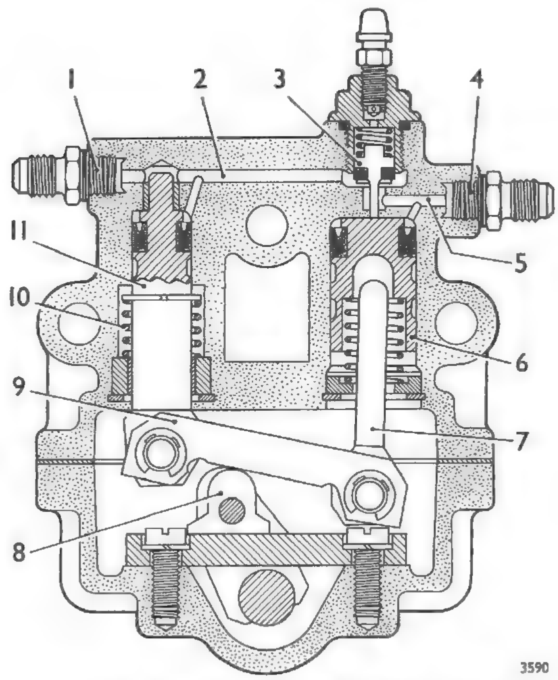
300 LOAD SENSING VALVE

The Clayton Dewandre load sensing valve, which is installed in the hydraulic line to the trailing axle brakes, graduates the hydraulic pressure from the slave master cylinder within a ratio range of 1 to 4 with the vehicle unladen and 1 to 1 with the vehicle fully laden.

The valve is mounted on the chassis side-member adjacent to the trailing axle, the valve operating lever being connected to a spring box on the trailing axle by an adjustable linkage.

The valve comprises a body and cover containing a valve assembly and two plungers connected by a balance beam.





When the brakes are applied, fluid under pressure enters port (1) in the body and passes along drillings (2) and (5) to the delivery port (4). The fluid pressure is also communicated to the top of the operating plunger (11) and when it overcomes the effect of spring (10) the plunger moves downwards. This causes the balance beam (9) to pivot about the fulcrum (8) causing the push rod (7) to move upwards until contact is made with bottom of the recess in the control plunger (6).

As the fluid pressure at the delivery port increases during brake application the control plunger moves downwards until the valve (3) contacts its seat and isolates the supply and delivery pressures. This state of balance can only be maintained while the delivery pressure on the control plunger balances the supply pressure on the operating plunger through the balance beam and according to the position of the fulcrum. The fulcrum is connected via a shaft to the valve operating lever and therefore its position relative to the balance beam varies according to vehicle load.

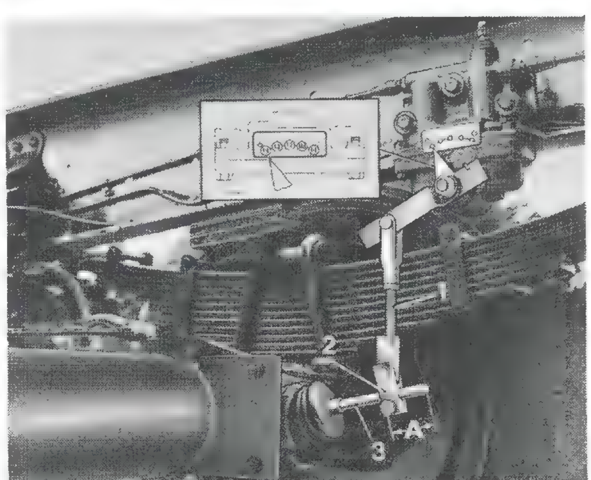
If the supply pressure is reduced slightly the force applied to the control plunger by the push rod will be reduced and the delivery pressure will drop accordingly without the valve (3) lifting off its seat.

When the brakes are released the supply pressure, and consequently the pressure above the valve (3), is relieved and the output pressure opens the valve allowing the fluid to return to the master cylinder.

In the full load condition, when the valve is giving a 1:1 ratio, the supply pressure is always sufficient to balance the pressure acting on the control plunger and valve (3) remains open.

300a LOAD SENSING VALVE – Linkage Adjustment

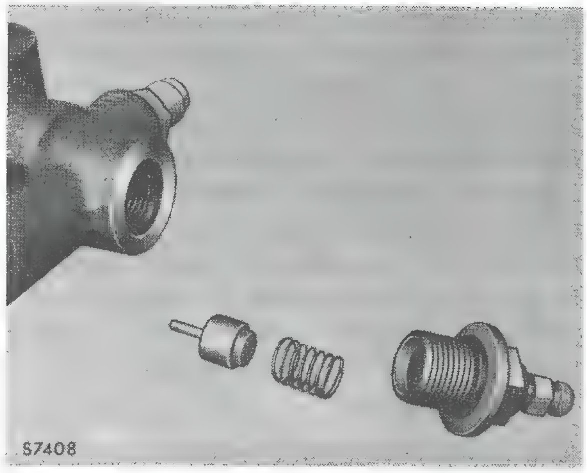
Adjustment of the linkage must be carried out with the vehicle fully laden.



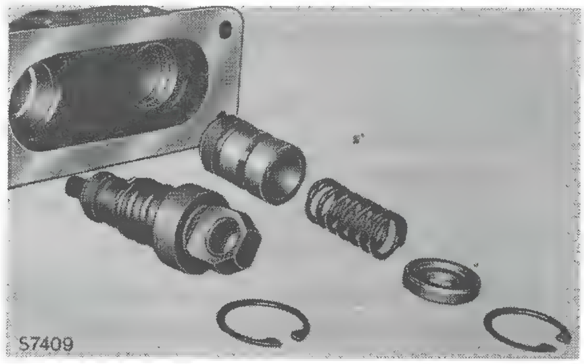
To adjust linkage, disconnect link from valve operating lever and set link clamp (2) at 1.50 in. (dimension 'A') from end of spring box rod.

With spring box rod (3) in unsprung position, i.e. at 90° to spring box, adjust length of link (1) until indicator on valve is at 1:1 position.

Valve and spring may be withdrawn from body after removal of plug.

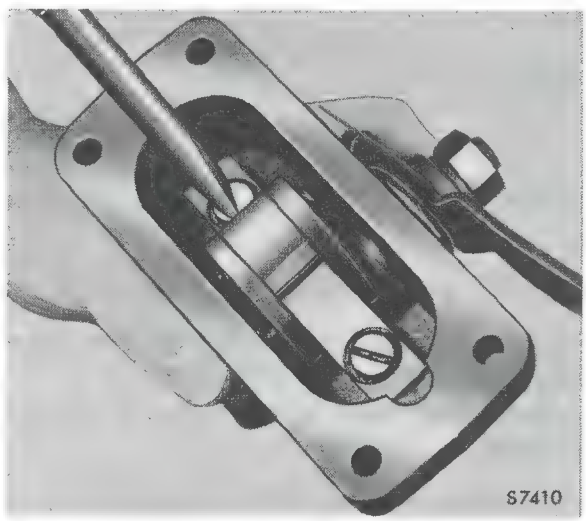


Access to circlips retaining operating and control plungers is gained by removing valve cover. Push rod and balance beam are retained by pivot pins secured with spring clips.



If necessary, operating plunger may be disassembled by removing spring ring.

Before shaft can be withdrawn, fulcrum support beam and fulcrum, which slots into operating shaft, must be removed.



Access to shaft seal is gained by removing nut, spacer, pointer, lever and spring and driving shaft through welch plug side of cover.

300c LOAD SENSING VALVE – Inspection

Discard all components which will be renewed from a repair kit.

Examine bushes in cover, push rod, operating plunger and retainer for signs of wear.

Inspect bores in body for scores and corrosion.

300d LOAD SENSING VALVE – Reassembly and Installation

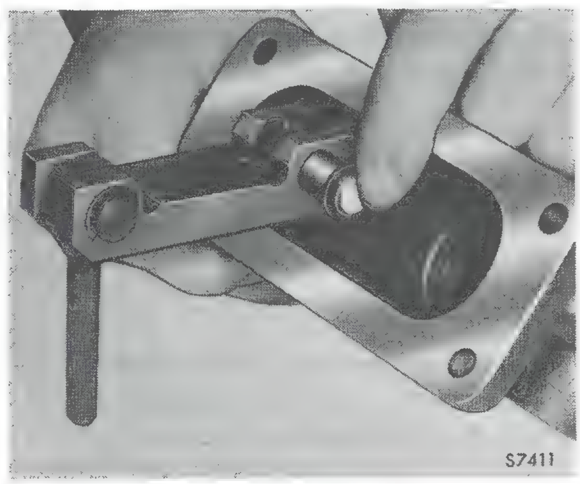
Smear plunger seals and bores in body with clean brake fluid before reassembly. Open side of seals face towards smaller end of plungers.

Press shaft seal into cover until closed side contacts bush.

When assembling control plunger, ensure spring locates in recessed side of retainer.

Liberally smear balance beam, fulcrum and pivot pins with recommended grease during assembly.

Assemble balance beam to operating plunger so that recessed side of beam faces away from plungers.



When installing valve on vehicle, assemble link to original hole in operating lever and carry out linkage adjustment.

301 NON-RETURN VALVES

Non-return valves, identical to those described in Section 75, are incorporated in the service and secondary reservoir supply connections and in the parking brake control valve supply line.

302 SAFETY VALVE

Refer to Section 76.

303 STOP LAMP SWITCHES

Stop lamp switches, similar to those described in Section 77, are operated by the brake pedal push rod and each spring brake actuator relay lever.

304 DUAL AIR RESERVOIR

Refer to Section 79.

305 SUPPLEMENTARY SECONDARY RESERVOIR

A second reservoir, mounted on the chassis crossmember forward of the driving axle, supplements the secondary side of the dual air reservoir.

The reservoir is provided with a drain tap.

306 COMPRESSOR GOVERNOR VALVE

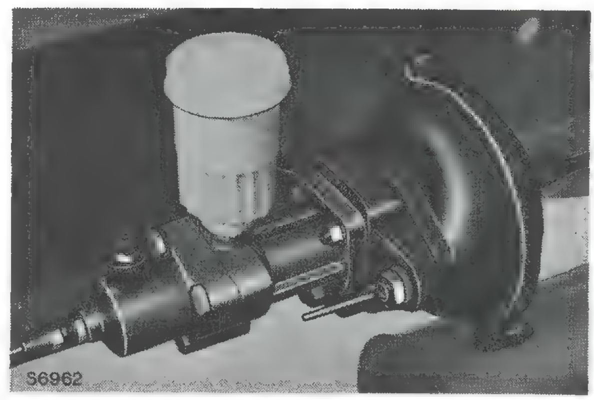
The compressor governor valve is similar to that described in Section 60. The cut-out pressure may be checked on the vehicle dual air pressure gauge.

307 AIR PRESSURE SERVO

The air pressure servo is similar to that described in Section 61 except that the governor feed pipe is connected to the dual air reservoir, and the low pressure warning switch is incorporated in the dual air pressure gauge.

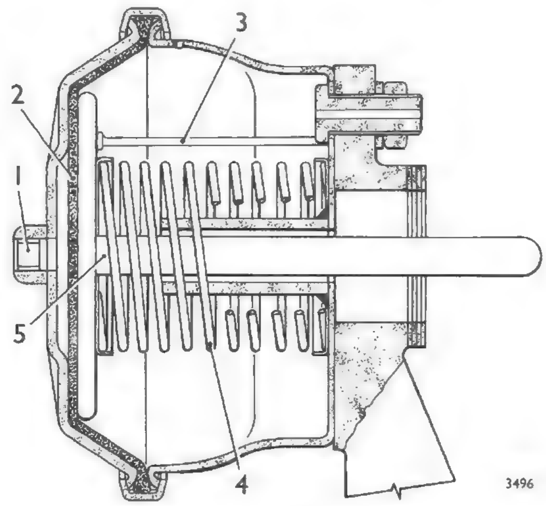
308 SLAVE ACTUATOR

The slave actuator is mounted together with the slave master cylinder on a support attached to the chassis sidemember. The actuator is of the 'pusher' type with a non-adjustable push rod extending through the actuator body to contact the master cylinder piston.



When the footbrake is applied, air from the servo enters the inlet port (1) behind the diaphragm (2) which, together with the push rod (5), moves against the return spring (4) and operates the master cylinder.

An indicator rod (3), which provides visual indication of trailing axle brake shoe travel is incorporated in the actuator.



308a SLAVE ACTUATOR – Leakage Test

Actuator may be checked for leakage by fully charging air system and, with footbrake applied, smearing soap solution over vents in body.

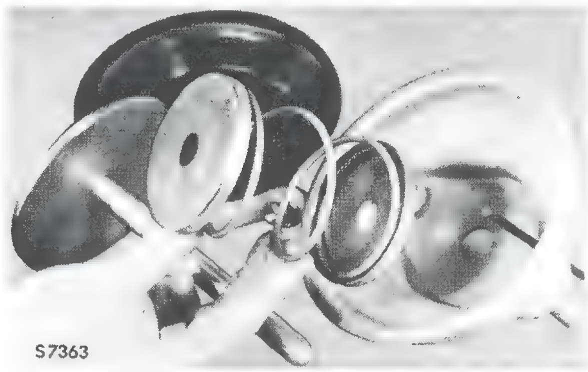
Leakage indicates a faulty diaphragm.

308b SLAVE ACTUATOR – Disassembly

Before removing clamp, mark position of body and cover in relation to clamp to ensure correct reassembly. Spring tension may be overcome by hand pressure.

308c SLAVE ACTUATOR – Reassembly and Installation

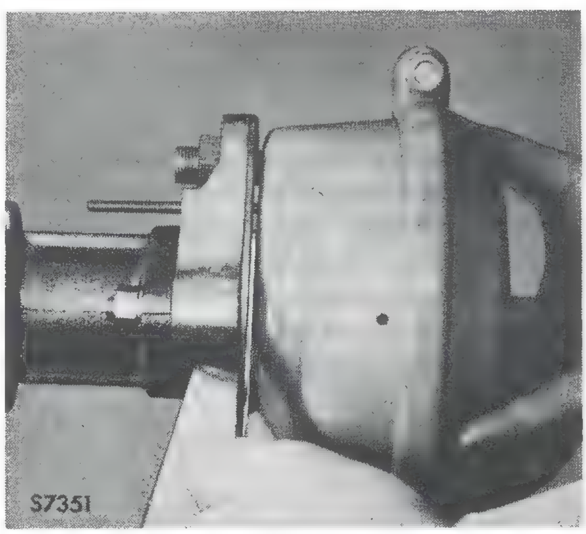
When assembling actuator, ensure spring seats are located over ends of spring and retain indicator rod with O-ring.



Tighten clamp bolts evenly to specified torque and recheck after diaphragm has been allowed to settle.

Before installing actuator, determine thickness of shims required between support and actuator to provide clearance between push rod and master cylinder piston.

To determine thickness of shims, position actuator on support without shims and measure gap between mounting faces with feeler gauges. Ensure master cylinder piston is not depressed during this operation.



Install shims to thickness of measured gap and add one shim of 0.030 in. thickness.

309 COMPRESSOR CYLINDER HEAD

Refer to Section 115.

310 COMPRESSOR

Refer to Section 116.

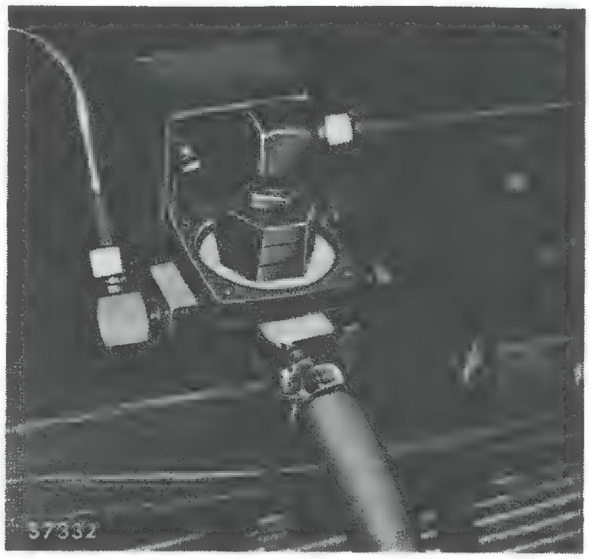
311 CHANGE-OVER VALVE

The change-over valve is similar to that described in Section 85 except that the valve delivers air to two spring brake actuators via a quick release valve.

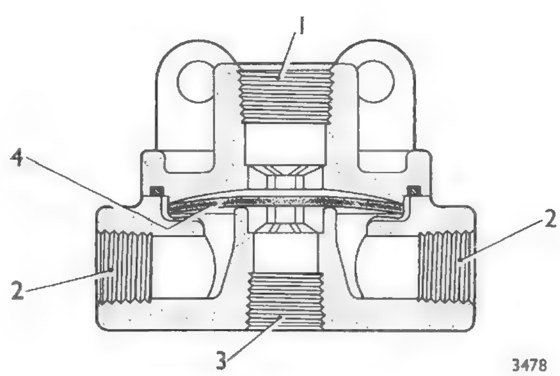
312 QUICK RELEASE VALVE

A quick release valve is incorporated in the air line to the spring brake actuators to reduce the time required to exhaust the air from the actuators.

The valve, which is mounted on the chassis sidemember adjacent to the driving axle, consists of a body and cover containing a diaphragm and a sealing ring.



When the parking brake is released, air pressure from the change-over valve enters the port (1) in the cover and moves the diaphragm (4) to close the exhaust port (3) in the body. The air pressure then deflects the edge of the diaphragm and passes through the delivery ports (2) to the actuators.



When the parking brake is applied, the air pressure above the diaphragm is reduced and the pressure in the actuators moves the diaphragm to close the supply port and allows the air to exhaust through the port in the body.

312a QUICK RELEASE VALVE — Operating Test

Valve may be checked for operation by fully charging air system and releasing parking brake. When parking brake is applied air should be exhausted promptly from valve.

312b QUICK RELEASE VALVE — Leakage Test

Valve may be checked for leakage by fully charging air system, releasing parking brake, and smearing exhaust port on valve with soap solution.

Leakage in excess of a one inch bubble in one second is not permissible.

Valve may be disassembled by removing cover screws.

313 PARKING BRAKE LINKAGE

Information concerning the parking brake linkage on the driving and trailing axles is contained in Section 86.

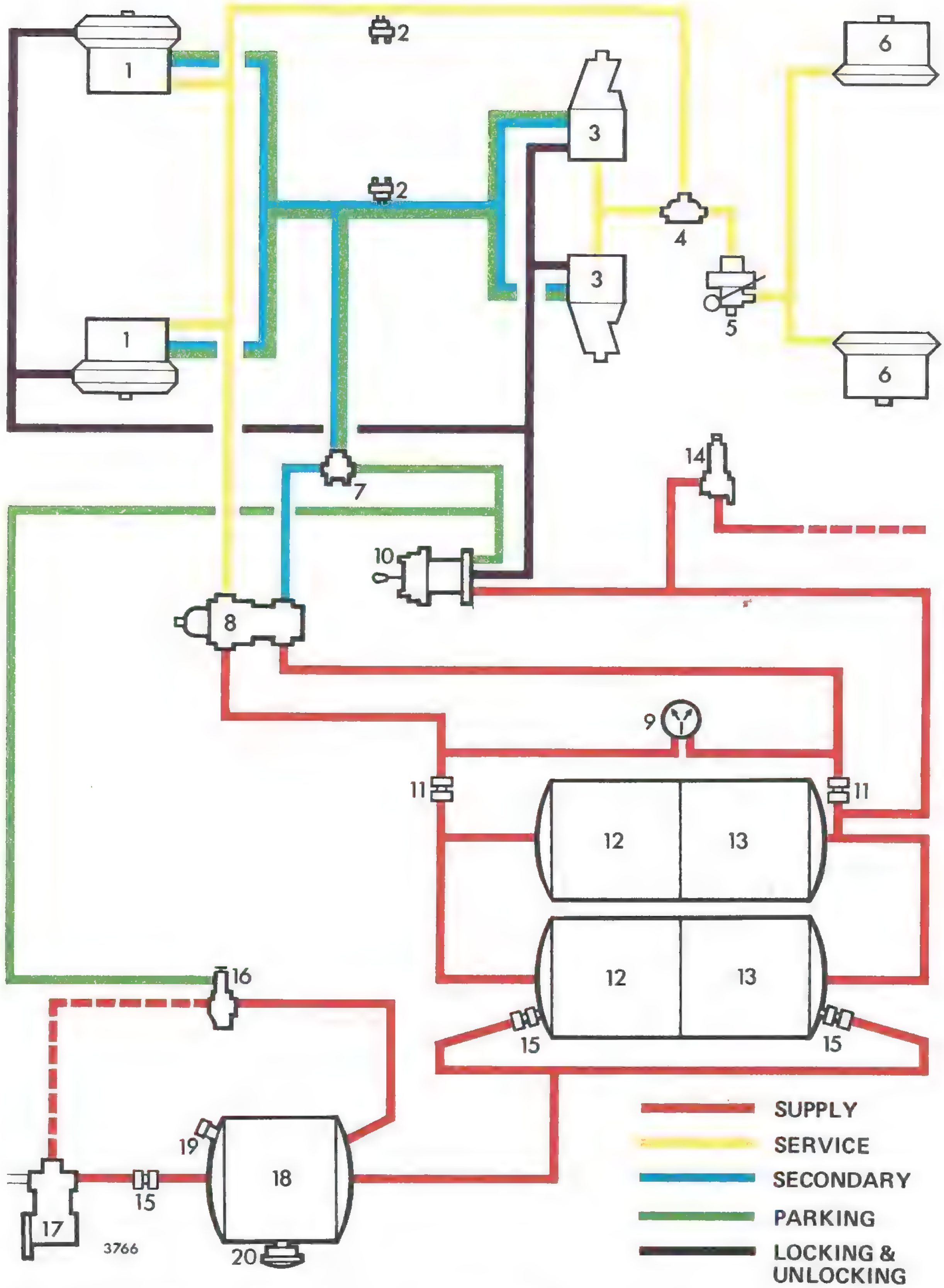
314 PARKING BRAKE CONTROL VALVE

Refer to Sections 87 and 88.

315 SPRING BRAKE ACTUATORS

Information concerning the spring brake actuators on the driving and trailing axles is contained in Sections 89 and 90.

DUAL AIR OPERATED SYSTEM WITH TWIN DRIVING AXLES



1. Front brake actuator
2. Stop lamp switch
3. First driving axle brake actuator
4. Quick release valve
5. Load sensing valve
6. Second driving axle brake actuator
7. Change-over valve
8. Footbrake valve
9. Dual air pressure gauge
10. Parking brake control valve
11. Biased non-return valve
12. Service reservoir
13. Secondary reservoir
14. Pressure loss limiting valve
15. Non-return valve
16. Governor valve
17. Compressor
18. Condensing reservoir
19. Safety valve
20. Automatic drain valve

Schematic diagram of braking system

The air pressure brake system operated by the footbrake valve, applies the front brakes by means of piston/diaphragm lock actuators and the forward driving axle brakes by means of dual piston lock actuators. The rear driving axle brakes are applied by means of single diaphragm actuators. The service and secondary air pressures delivered by the footbrake valve are not equal and the front and forward driving axle actuators normally respond to the service pressure which is the greater of the two. The rear driving axle actuators respond to service air pressure only.

In the event of failure of the service system the secondary system remains operational without loss of braking power on the front and forward driving axles.

A load sensing valve is incorporated in the air line to the rear driving axle brake actuators.

A parking brake control valve operates the brakes on the front and forward driving axles by means of the actuators which incorporate air pressure controlled lock mechanisms for holding the brakes on. Provision is made in the condensing reservoir for the attachment of an independent air supply should it become necessary to move the vehicle while the engine is inoperative.

A dual air pressure gauge in the instrument panel indicates the service and secondary reservoir pressures. The pressures shown on the dual air gauge are approximately 1.5 bar (20 lb/sq in.) below the actual pressures in the reservoirs due to the presence of a biased non-return valve in each supply line to the footbrake valve.

The front and rear brakes are of the two-leading-shoe type operated by wedge and roller expanders.

316 BRAKE ADJUSTMENT

Refer to Section 156.

317 BRAKE PEDAL AND LINKAGE

The brake pedal and linkage is similar to that described in Section 20 except that the relay lever pivots on a non-metallic bush and its connected, by a short push rod, to the footbrake valve.

The pedal side clearance is not adjustable.

317a BRAKE PEDAL SETTING

Refer to Section 157a.

318 BRAKE DRUMS

Information concerning the brake drums is contained in Section 158. Release parking brake before removing front hub and drum assemblies.

319 BRAKE SHOES

Refer to Section 159.

320 BRAKE ADJUSTERS

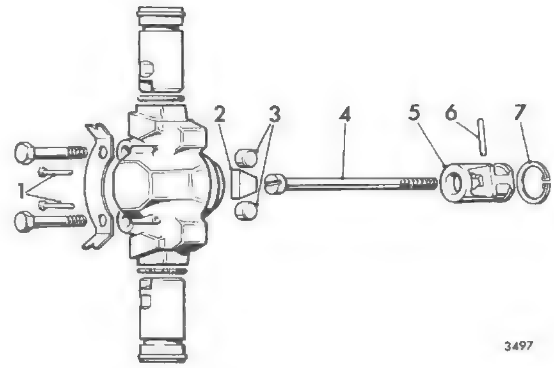
Refer to Section 160.

321 BRAKE EXPANDERS

The brake expanders are similar to those described in Section 161 except that the rear driving axle brake expanders are of the 'pull' type.

When disassembling a rear driving axle brake expander, plungers may be withdrawn after removal of rivets (1) in expander housing.

Wedge (2), rollers (3) and pull rod (4) may be withdrawn after removal of circlip (7). Pull rod may be separated from link (5) by removing spring pin (6).



322 FRONT BRAKE ACTUATORS

The front brake actuators are similar to those described in Section 183 except that in the event of failure of the service system, air from the secondary side of the footbrake valve enters the secondary/park ports to apply the brakes.

323 FORWARD DRIVING AXLE BRAKE ACTUATORS

Refer to Section 163.

324 REAR DRIVING AXLE BRAKE ACTUATORS

Refer to Section 272.

325 LOAD SENSING VALVE

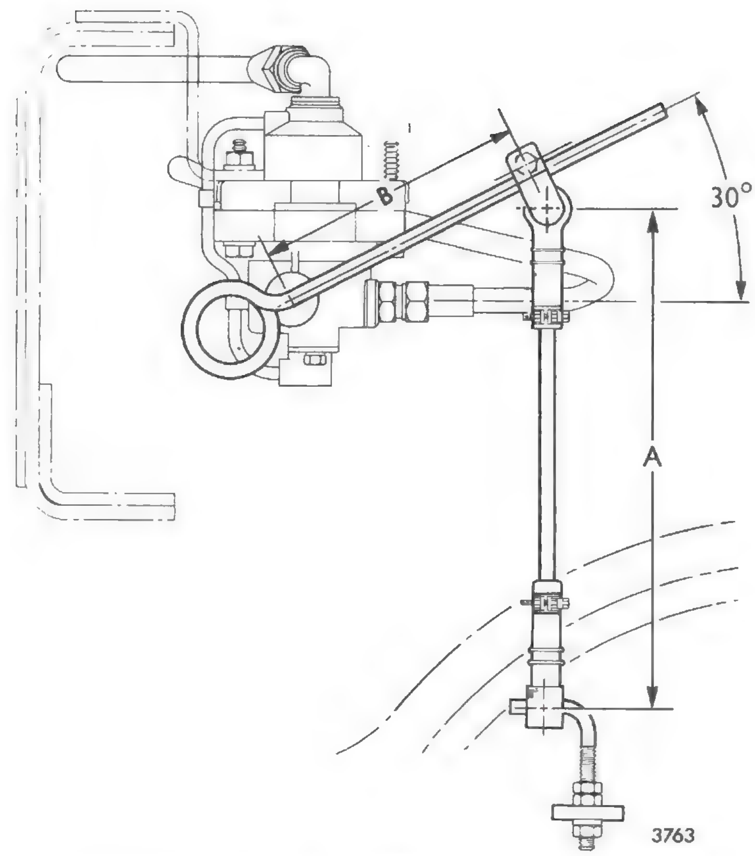
The Westinghouse load sensing valve, incorporated in the air line to the rear driving axle brakes, is similar to that described in Section 273 except for the linkage adjustment.

325a LOAD SENSING VALVE — Linkage Adjustment

Adjustment of the linkage must be carried out with the vehicle fully laden.

To adjust linkage, disconnect link from bracket on axle housing and check that dimension 'B' between centre of pivot and centre of clamp bolt is 6.00 in.

After adjusting length of link (dimension 'A') to 12.00 in. insert threaded end of link in bracket on axle casing and adjust nuts until operating lever is 30° above horizontal.



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326 NON-RETURN VALVES

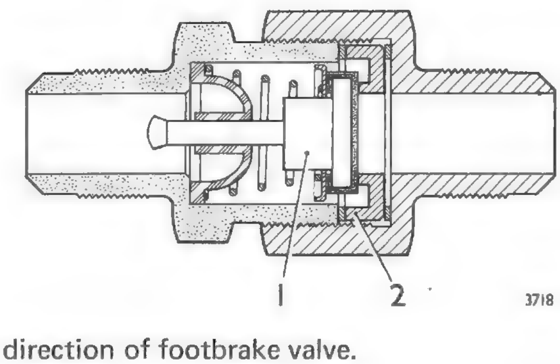
Non-return valves, identical to those described in Section 75, are incorporated in the supply connections to the dual air reservoir mounted on the inside of the chassis sidemember. A line non-return valve is also incorporated in the air line between the compressor and the condensing reservoir.

When installing line non-return valve, arrow on body must be in direction of condensing reservoir.

Biased non-return valves are incorporated in the service and secondary supply air lines to the footbrake valve. The valves, which maintain the pressure at the footbrake valve at 1.5 bar (20 lb/sq in.) less than reservoir pressure, ensure that the brakes on the front and forward driving axles cannot be locked on at full reservoir pressure by application of the footbrake during or after moving the parking brake control lever to the 'PARK' position.

Since the dual air pressure gauge is supplied from the lower pressure side of the biased non-return valves, the gauges will read 6.5 bar (100 lb/sq in.) when the governor valve cuts out at 8 bar (120 lb/sq in.).

The valves, which are identical, consist of a body and screw cap containing a flat headed rubber valve (1), spring-loaded against a valve seat (2).



3718

When installing valves, ensure arrow on body is in direction of footbrake valve.

327 SAFETY VALVE

Information concerning the safety valve is contained in Section 105. Operating pressure of valve may be checked on dual air gauge by charging system with parking brake control lever held in 'AUX & UNLOCK' position. Due to the presence of biased non-return valves in the supply air lines to the footbrake valve, the pressure indicated on the dual air gauge when the safety valve operates will be approximately 1.5 bar (20 lb/sq in.) below the specified safety valve operating pressure.

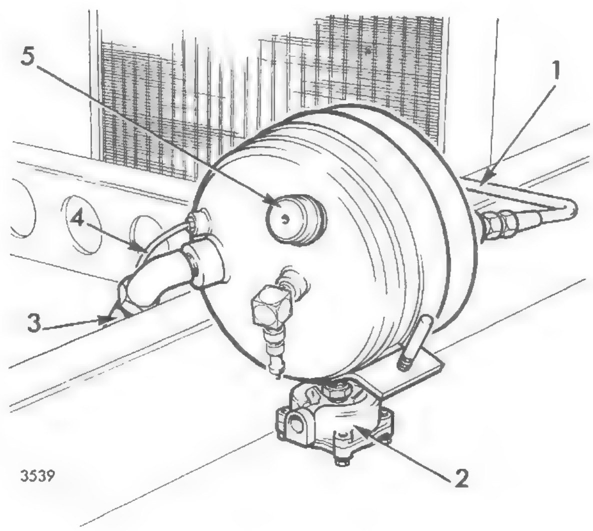
328 STOP LAMP SWITCHES

Stop lamp switches similar to those described in Section 106 are incorporated in the air lines from the footbrake valve to the actuators.

329 CONDENSING RESERVOIR

A condensing reservoir, fed by air from the compressor via a non-return valve and air line (3), is mounted on the chassis sidemember at the front of the vehicle to ensure maximum air cooling and condensation of water vapour.

The reservoir is fitted with an automatic water drain valve (2) and a non-adjustable ball-type safety valve (5). Air lines (1 and 4) supply the dual air reservoirs and compressor governor valve respectively.

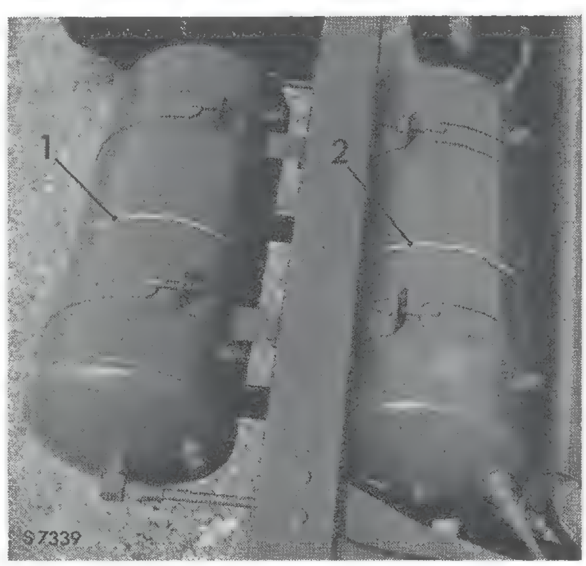


330 DUAL AIR RESERVOIRS

A dual reservoir (2) comprising a service air reservoir and a secondary air reservoir combined in one assembly is mounted on the inside of the chassis sidemember. The reservoirs, which are fed with dry air from the condensing reservoir via non-return valves, supply air to the footbrake valve. The secondary reservoir also supplies air to the parking brake control valve, two-speed axle shift units and differential lock.

The service and secondary parts of the reservoir are supplemented by a second dual air reservoir (1) mounted on the outside of the chassis sidemember.

The reservoirs are provided with drain plugs.

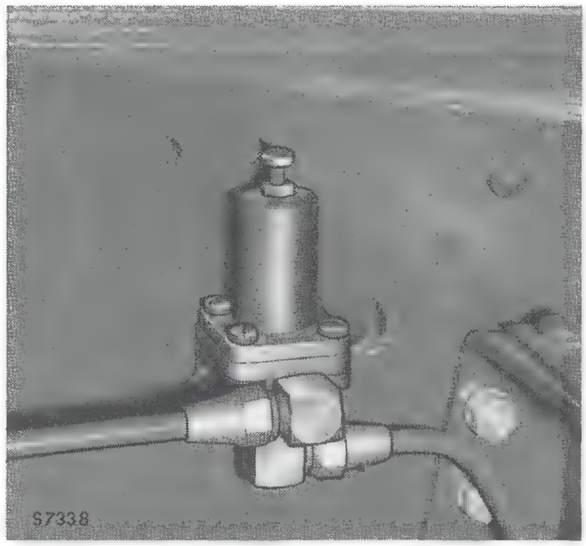


331 AUTOMATIC DRAIN VALVE

Refer to Section 110.

332 PRESSURE LOSS LIMITING VALVE

To prevent complete loss of air from the secondary reservoirs in the event of severe air leakage in the two-speed axle shift units or differential lock, a pressure loss limiting valve is incorporated in the system.



The valve consists of a body and cover containing a spring, adjusting screw, diaphragm, valve and valve seat.

Compressed air from the secondary reservoirs enters the valve beneath the diaphragm. When the air pressure is sufficient to overcome the spring pressure the valve opens to allow air to pass to the solenoid valves controlling the third differential lock and two-speed shift units.

332a PRESSURE LOSS LIMITING VALVE — Operating Test

Valve may be checked for operation by exhausting air from secondary reservoirs by repeated application of parking brake. After disconnecting delivery air line from valve, charge system and note pressure indicated on secondary reservoir gauge at which air begins to escape from valve.

Pressure indicated on gauge will be approximately 1.5 bar (20 lb/sq in.) less than operating pressure of valve due to the presence of biased non-return valves in air lines between reservoirs and footbrake valve.

If operating pressure of valve is not within specified limits, adjust valve spring tension by means of screw in cover.

332b PRESSURE LOSS LIMITING VALVE – Leakage Test

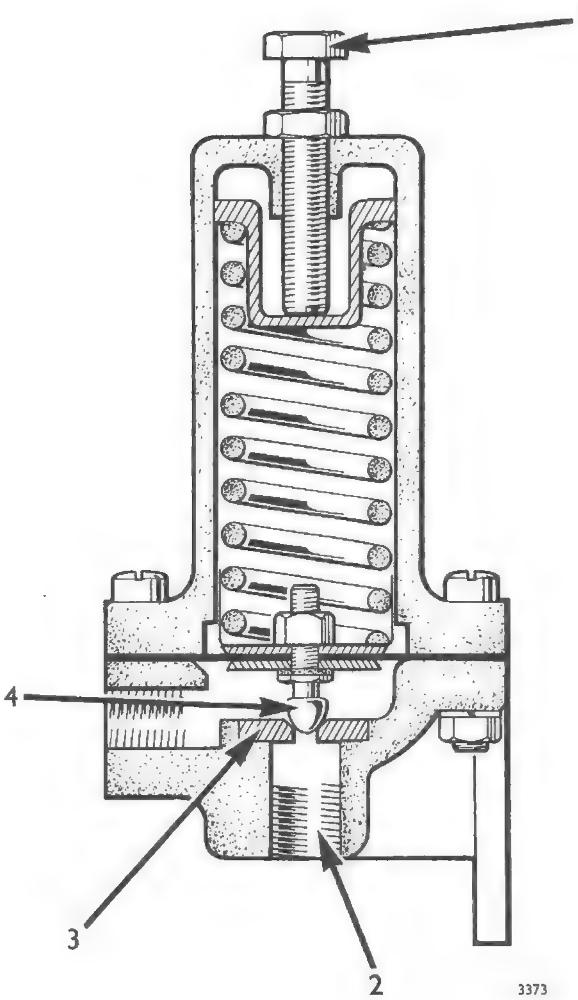
Valve may be checked for leakage by fully charging air system and smearing body and cover with soap solution. Leakage from cover indicates a faulty diaphragm.

When disassembling valve, back off adjusting screw (1) before progressively slackening cover bolts.

Valve seat (3) may be removed by inserting a drift through delivery port (2).

Diaphragm and valve assembly (4) together with valve seat are contained in repair kit.

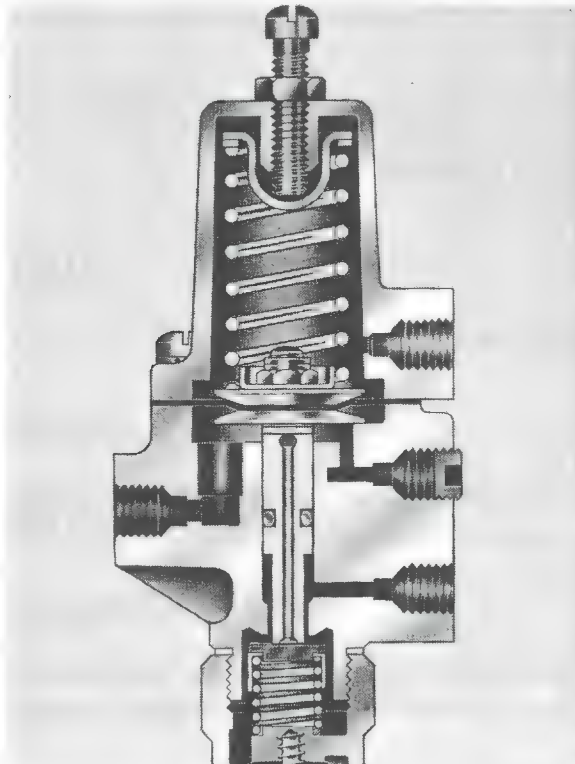
After pressing valve seat into body, lightly tap a 5/16in. diameter steel ball on to seat to form an air tight seating for valve.



After installing valve on vehicle, carry out operating test.

333 COMPRESSOR GOVERNOR VALVE

The compressor governor valve is similar to that described in Section 60 except that the top cover is sealed and provided with a tapped inlet port. A nylon pipe connects the port to the parking brake control valve delivery air line. When the parking brake control lever is in the 'AUX & UNLOCK' position, air pressure enters the governor valve cover and prevents the valve from cutting-out at the normal operating pressure. If necessary, the system may be charged to the safety valve operating pressure.



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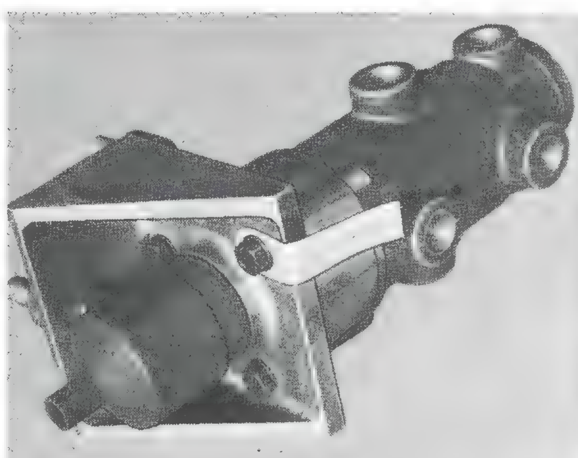
When checking the governor valve cut-out pressure on the vehicle dual air pressure gauge, note that the gauges will read 6.5 bar (100 lb/sq in.) when the valve cuts-out at 8 bar (120 lb/sq in.) due to the presence of biased non-return valves in the air lines between the reservoirs and the footbrake valve.

334 FOOTBRAKE VALVE

The footbrake valve is similar to that described in Section 114 except that the front piston return spring is weaker than the rear piston return spring. This differential maintains the service line air pressure to the actuators approximately 1.7 bar (25 lb/sq in.) more than the secondary line pressure until maximum pedal pressure is reached, when the air pressure in both lines is the same.

The valve may be recognised by the type number APGA 6376 stamped on the identification tag attached to the valve.



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335 COMPRESSOR CYLINDER HEAD

Refer to Section 115.

336 COMPRESSOR

Refer to Section 116.

337 CHANGE-OVER VALVE

Refer to Section 286.

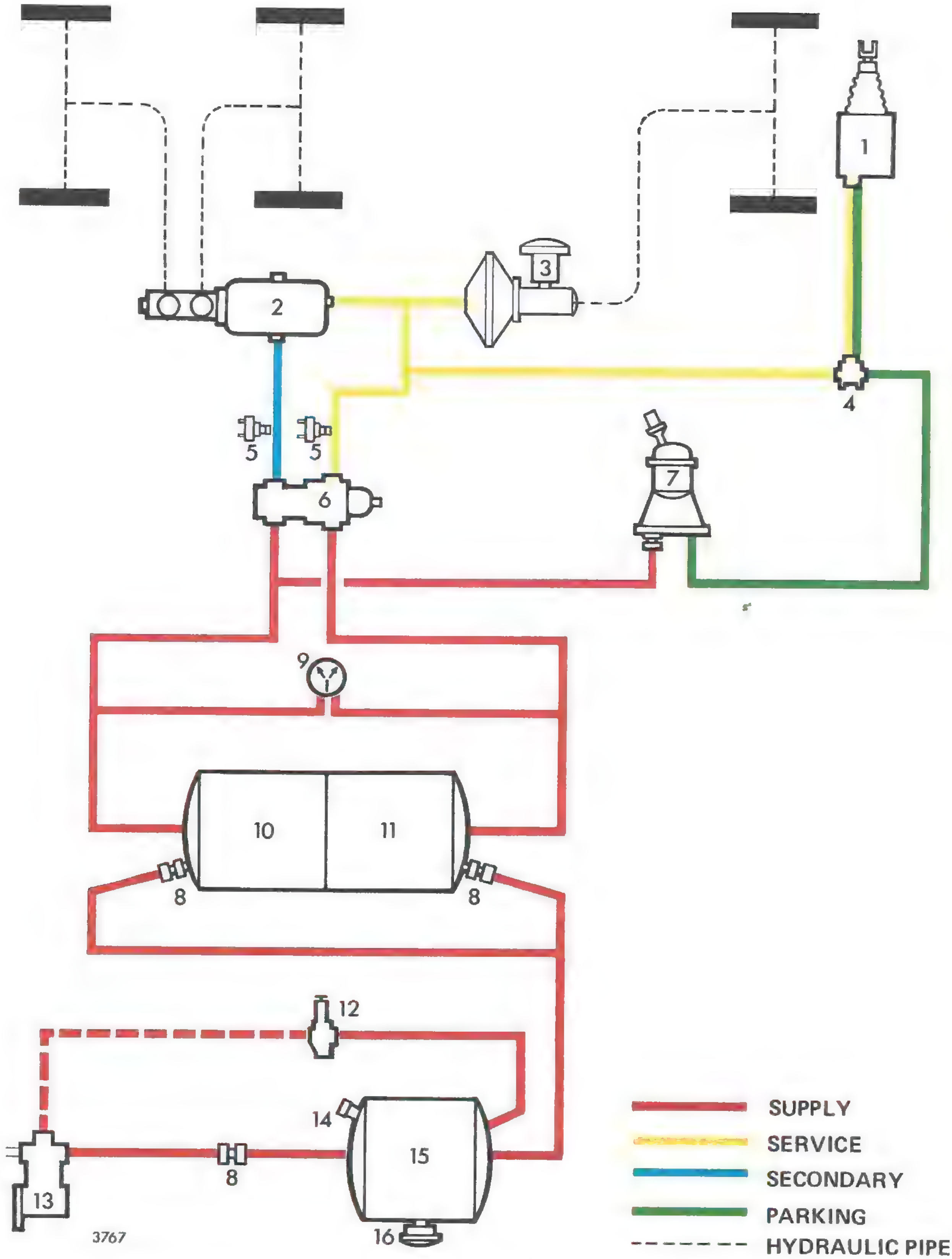
338 QUICK RELEASE VALVE

Information concerning the quick release valve, incorporated in the service air line to the driving axle brake actuators, is contained in Section 287.

339 PARKING BRAKE CONTROL VALVE

The parking brake control valve is similar to that described in Section 176 except that the front brake actuator locks and diaphragms are also controlled by the valve.

AIR PRESSURE OPERATED HYDRAULIC SYSTEM WITH TWIN STEERING AXLES



1. Spring brake actuator
2. Master cylinder actuator
3. Slave actuator and master cylinder
4. Change-over valve
5. Stop lamp switch
6. Footbrake valve
7. Parking brake control valve
8. Non-return valve
9. Dual air pressure gauge
10. Secondary reservoir
11. Service reservoir
12. Governor valve
13. Compressor
14. Safety valve
15. Condensing reservoir
16. Automatic drain valve

Schematic diagram of braking system

The air/hydraulic braking system operated by the footbrake pedal applies the brakes on the steering axles by means of a master cylinder actuator and hydraulic tandem master cylinder. The actuator has a service and secondary means of air supply which are independent of each other and controlled by a footbrake valve. In the event of failure of the service system the secondary system remains operational, to provide reduced but positive braking on the steering axles.

The rear brakes are applied by means of a slave actuator and master cylinder. The slave actuator is supplied with air from the service reservoir and controlled by the footbrake valve.

A parking brake control valve operates the brakes on the rear wheels by means of a spring brake actuator and mechanical linkage. When the parking brake is applied air is exhausted from the spring brake actuator and the brakes are held on by spring pressure. Provision is made in the condensing reservoir for the attachment of an independent air supply should it become necessary to move the vehicle while the engine is inoperative.

A dual air pressure gauge in the instrument panel indicates the service and secondary reservoir pressures.

The hydraulic brakes are of the leading/trailing shoe type operated by double acting brake cylinders.

340 BRAKE ADJUSTMENT

Adjustment of the brakes is as described in Section 31.

Before adjusting brakes, fully charge air system and release parking brake. The parking brake is adjusted automatically with the footbrake adjustment and no other adjustment is required except after parts of the parking brake linkage have been disturbed.

341 BLEEDING THE HYDRAULIC SYSTEM

Before bleeding system, fully charge air system, adjust brakes, and release parking brake.

Bleed steering axle brakes in sequence left-hand leading, right-hand leading, left-hand trailing, right-hand trailing. It is not necessary to fully depress brake pedal during this operation. To ensure master cylinder pistons fully return after each stroke of brake pedal, exhaust diaphragm should be removed from rear of footbrake valve during bleeding operation.

When bleeding rear axle hydraulic system, fully charge air system and, with parking brake released, remove all traces of air from slave master cylinder before bleeding brake cylinders.

After bleeding system, push indicator rods into master cylinder actuator and slave actuator until resistance is felt and apply heavy pressure to brake pedal. Indicator rods should not emerge sufficiently to reveal their grooves as this indicates presence of air, leakage in hydraulic system or incorrect brake shoe adjustment.

342 BRAKE PEDAL AND LINKAGE

The brake pedal and linkage is similar to that described in Section 20 except that the relay lever pivots on a non-metallic bush and is connected, by a push rod, to the footbrake valve.

342a BRAKE PEDAL SETTING

Refer to Section 95a.

343 BRAKE DRUMS

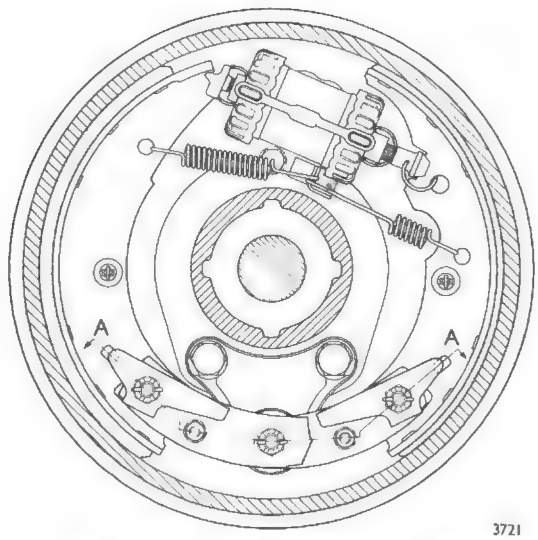
Refer to Section 34.

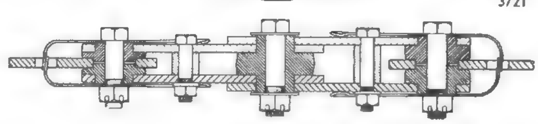
344 FRONT BRAKE SHOES

The front brakes are similar to those described in Section 5 except that each shoe is provided with a drum-type adjuster and individual pull-off spring.

When refacing shoes, install shorter rivets in eight holes nearest centre of shoe.

When assembling pull-off springs attach squared end to brake shoes and ensure spring with greater number of coils is attached to leading shoe.





SECTION A-A

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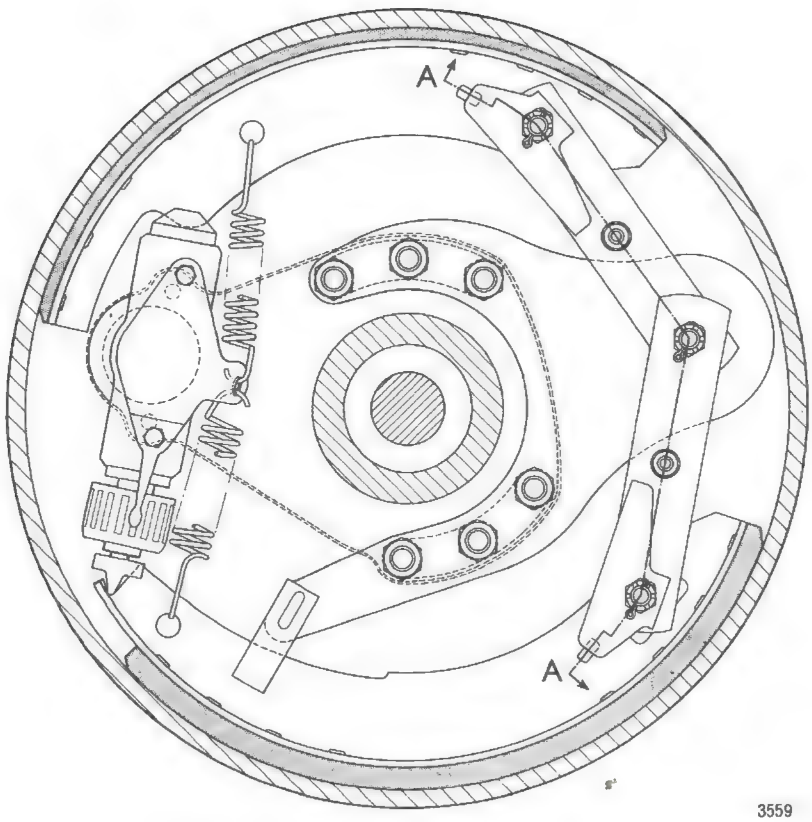
345 REAR BRAKE SHOES

The rear brakes are similar to those described in Section 6.

Before removing hub and drum assembly, fully charge air system, release parking brake, and disconnect spring brake actuator clevis from relay lever.

When refacing shoes, install shorter rivets in eight holes nearest centre of shoe.

When assembling pull-off springs attach squared end to brake shoe and ensure spring with larger coils is attached to leading shoe.



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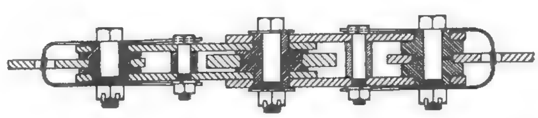

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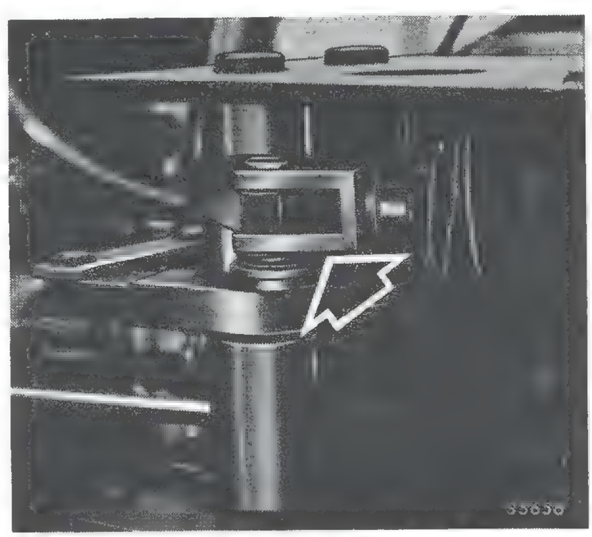
346 FRONT BRAKE CYLINDERS

Refer to Section 37.

347 REAR BRAKE CYLINDERS

The rear brake cylinders are similar to those used with direct vacuum servo assisted brakes and the information contained in Section 8 may be applied.

Before removing rods from bell crank lever, fully charge air system and, with parking brake released, disconnect spring brake actuator clevis from relay lever.



After installing cylinder, adjust length of rods as described under 'Parking Brake Linkage' in Section 86a.

348 REAR BRAKE BISECTORS

The rear brake bisectors are similar to those used with direct-vacuum servo-assisted brakes and the information contained in Section 9 may be applied except for the brake cylinder removal and installation procedure described under the previous heading.

349 MASTER CYLINDER

Information concerning the master cylinder, which operates the steering axle brakes, is contained in Section 55.

350 SLAVE MASTER CYLINDER

Information concerning the slave master cylinder, which operates the rear brakes, is contained in Section 299.

When installing master cylinder, determine thickness of shims required between support and slave actuator as described in Section 308c.

351 NON-RETURN VALVES

Non-return valves, identical to those described in Section 75, are incorporated in the service and secondary reservoir supply connections and in the parking brake control valve supply line. In addition, a line non-return valve is included in the air line between the compressor and the condensing reservoir. When installing valve, arrow on body must be in direction of condensing reservoir.

352 SAFETY VALVE

Refer to Section 105.

353 STOP LAMP SWITCHES

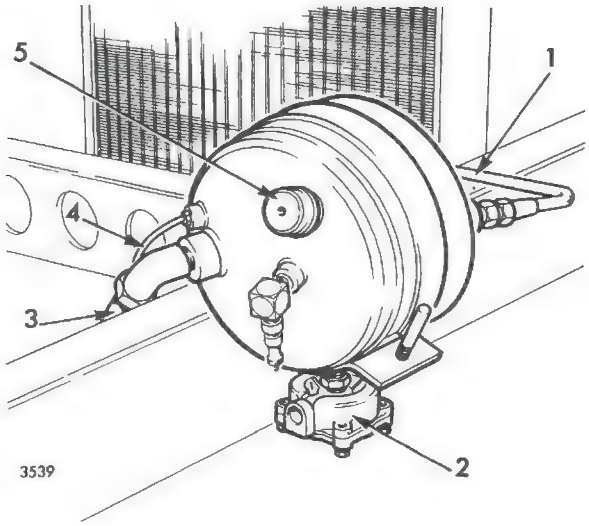
The stop lamp switches, incorporated in the air lines to the master cylinder actuator, are as described in Section 106.

354 CONDENSING RESERVOIR

A condensing reservoir, fed by air from the compressor via a non-return valve and air line (3), is mounted on the chassis sidemember at the front of the vehicle.

The reservoir is fitted with an automatic water drain valve (2) and a non-adjustable ball-type safety valve (5).

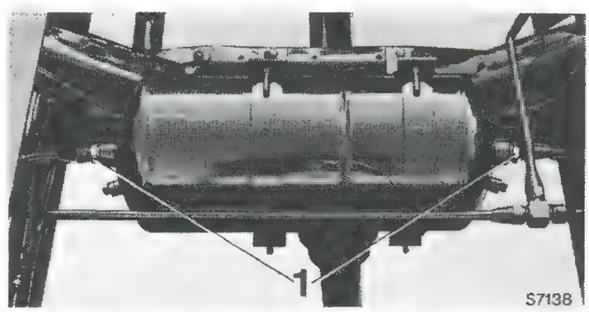
Air lines (1 and 4) supply the dual air reservoir and compressor governor valve respectively.



355 DUAL AIR RESERVOIR

A dual reservoir comprising a service air reservoir and a secondary air reservoir combined in one assembly is mounted on the chassis crossmember. The reservoirs, which are fed with dry air from the condensing reservoir via non-return valves (1), supply air to the footbrake valve. The secondary reservoir also supplies the parking brake control valve.

The reservoirs are provided with drain plugs.



356 AUTOMATIC DRAIN VALVE

Refer to Section 110.

357 COMPRESSOR GOVERNOR VALVE

The compressor governor valve is similar to that described in Section 60. The cut-out pressure may be checked on the vehicle dual air pressure gauge.

358 MASTER CYLINDER ACTUATOR

Refer to Section 113.

359 SLAVE ACTUATOR

The slave actuator is similar to that described in Section 308 except that it is supplied with air from the footbrake valve.

360 FOOTBRAKE VALVE

Refer to Section 114.

361 COMPRESSOR CYLINDER HEAD

Refer to Section 115.

362 COMPRESSOR

Refer to Section 116.

363 CHANGE-OVER VALVE

The operation and construction of the change-over valve is as described in Section 85 except that when the parking brake is released the valve prevents leakage through the footbrake valve. Leakage at footbrake valve port of change-over valve may be detected by fully charging system and smearing exhaust diaphragm at rear of footbrake valve with soap solution. Leakage in excess of a ½ in. bubble in five seconds, with parking brake valve in 'OFF' position, indicates a faulty shuttle valve.

364 PARKING BRAKE LINKAGE

Refer to Section 86.

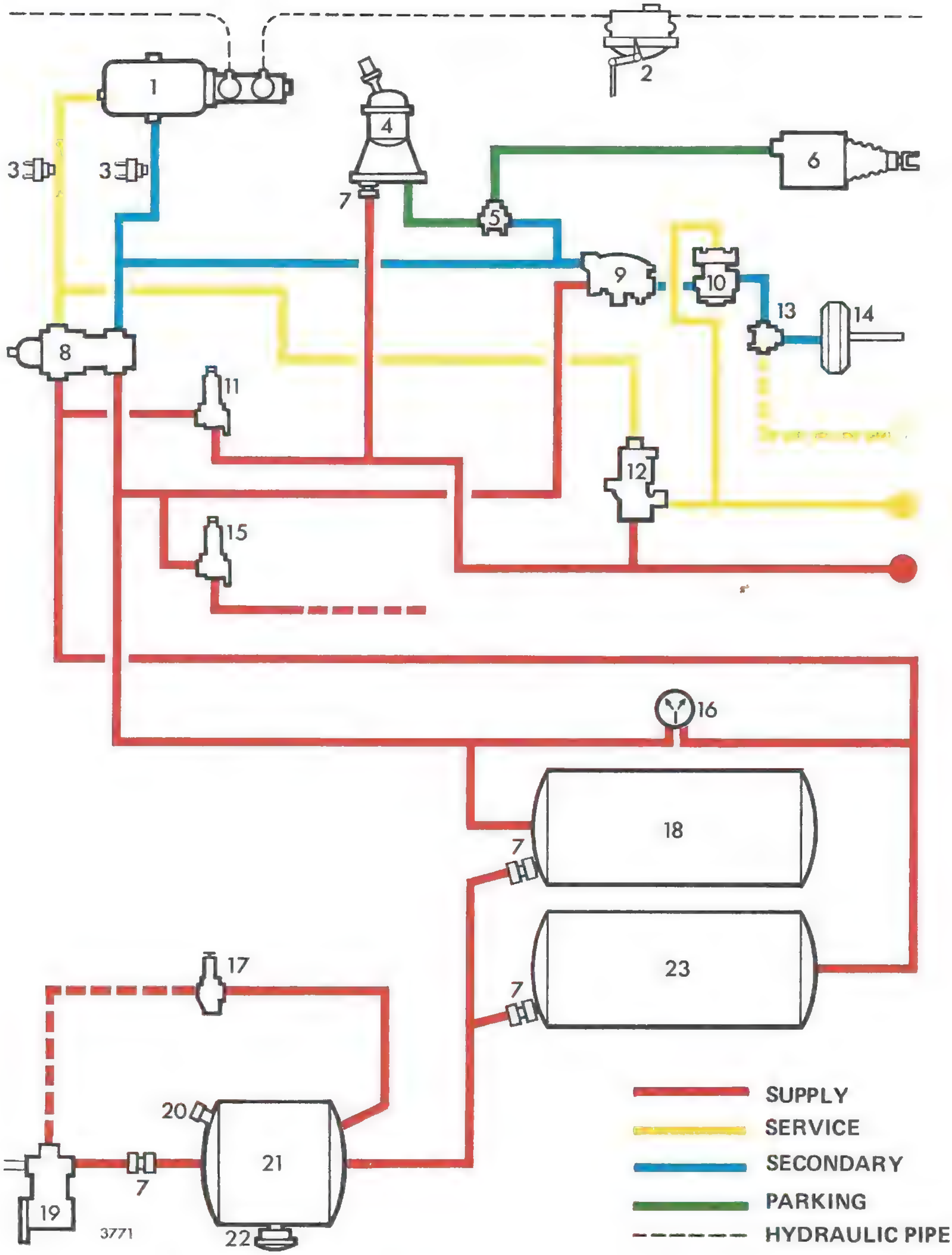
365 PARKING BRAKE CONTROL VALVE

Refer to Sections 87 and 88.

366 SPRING BRAKE ACTUATOR

Refer to Sections 89 and 90.

AIR PRESSURE OPERATED HYDRAULIC SYSTEM WITH AUTOMATIC TRAILER COUPLING



1. Master cylinder actuator
2. Load sensing valve
3. Stop lamp switch
4. Parking brake control valve
5. Change-over valve
6. Spring brake actuator
7. Non-return valve
8. Footbrake valve
9. Relay valve
10. Anti-compound valve
11. Pressure loss limiting valve
12. Differential relay valve
13. Change-over valve
14. Mechanical trailer brake actuator
15. Pressure loss limiting valve for coupling release
16. Dual air pressure gauge
17. Governor valve
18. Secondary reservoir
19. Compressor
20. Safety valve
21. Condensing reservoir
22. Automatic drain valve
23. Service reservoir

Schematic diagram of braking system

The air/hydraulic braking system operated by the footbrake pedal applies the tractor brakes by means of a master cylinder actuator and hydraulic tandem master cylinder. The actuator has a service and secondary means of air supply which are independent of each other and controlled by a footbrake valve. In the event of failure of the service system the secondary system remains operational to provide reduced but positive braking.

The trailer service air line and the mechanical trailer brake actuator (secondary system) are also controlled by the footbrake valve. The service air line is provided with a yellow flexible connecting hose. The trailer emergency air line, fed from the tractor service reservoir has a red flexible connecting hose and performs two functions, (a) it supplies air to the trailer reservoir, and (b), in conjunction with a relay and inverted relay valve mounted on the trailer, provides a means of automatically applying the trailer brakes should the emergency line fail as in the event of trailer break-away.

A parking brake control valve operates the brakes on the rear wheels by means of a spring brake actuator and mechanical linkage. When the parking brake is applied, air is exhausted from the spring brake actuator and the brakes are held on by spring pressure.

Provision is made in the condensing reservoir for the attachment of an independent air supply should it become necessary to move the vehicle while the engine is inoperative.

A dual air pressure gauge in the instrument panel indicates the service and secondary reservoir pressures.

The hydraulic brakes are of the leading/trailing shoe type operated by double-acting brake cylinders.

367 BRAKE ADJUSTMENT

Adjustment of the brakes is as described in Section 93 for Models EOR and ERT.

368 BLEEDING THE HYDRAULIC SYSTEM

Before bleeding system, fully charge air system, adjust brakes and release parking brake.

Bleed load sensing valve before bleeding each brake in sequence left-hand rear, right-hand rear, left-hand front, right-hand front. It is not necessary to fully depress brake pedal during this operation, and to ensure master cylinder pistons fully return after each stroke of brake pedal, exhaust diaphragm should be removed from rear of footbrake valve during bleeding operation.

After bleeding system, push indicator rod into master cylinder actuator until it contacts piston and apply heavy pressure to brake pedal. Check that rod does not emerge sufficiently to reveal its groove as this indicates presence of air, leakage in hydraulic system or incorrect brake shoe adjustment.

369 BRAKE PEDAL AND LINKAGE

The brake pedal and linkage is similar to that described in Section 20 except that the relay lever pivots on a non-metallic bush and is connected, by a push rod, to the footbrake valve.

369a BRAKE PEDAL SETTING

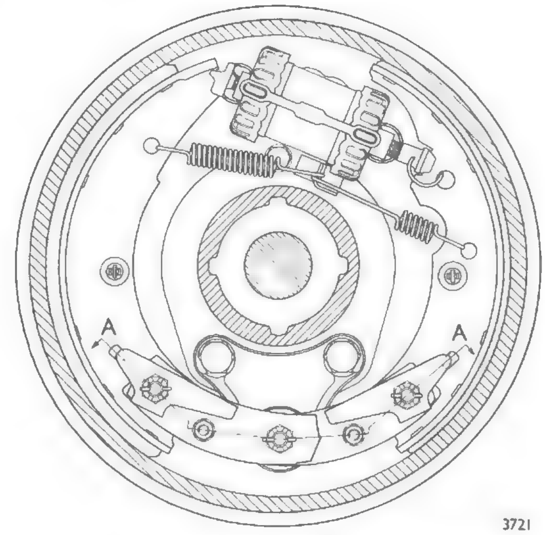
Refer to Section 95a.

370 BRAKE DRUMS

The brake drums are similar to those used with suspended-vacuum servo-assisted brakes and the information contained in Section 34 may be applied.

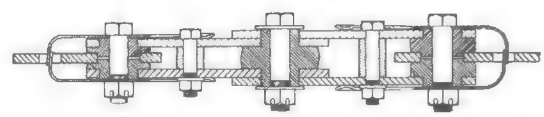
371 FRONT BRAKE SHOES

The front brakes are similar to those described in Section 5 except that each shoe is provided with a drum-type adjuster and individual pull-off spring.



3721

When assembling pull-off springs attach squared end to brake shoe and ensure spring with greater number of coils is attached to leading shoe.



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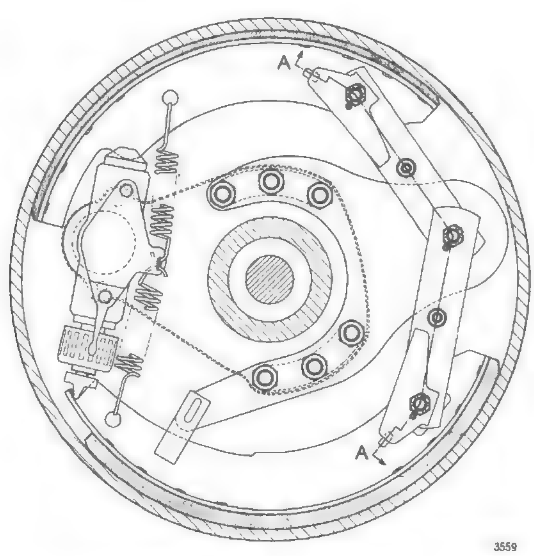
372 REAR BRAKE SHOES

The rear brakes are similar to those described in Section 6 except that drum-type shoe adjusters actuated by a sprocket attached to a square headed spindle are used.



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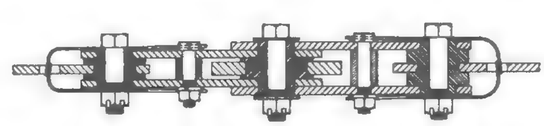
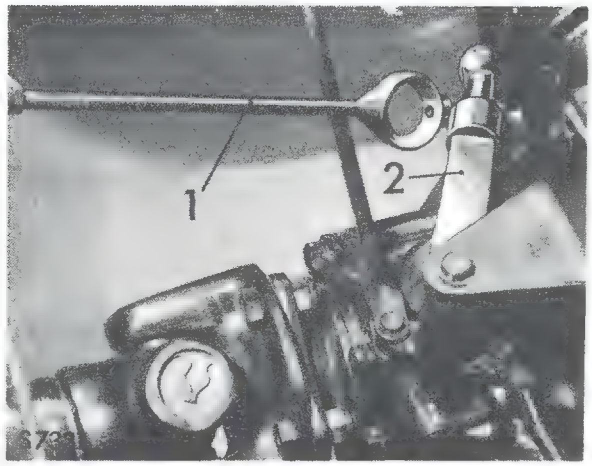


SECTION A-A 3714

Before removing hub and drum assembly, fully charge air system, release parking brake, and disconnect pull rod eye (1) from bell crank lever (2) on rear axle.



When assembling pull-off springs attach squared end to brake shoe and ensure spring with larger coils is attached to leading shoe.

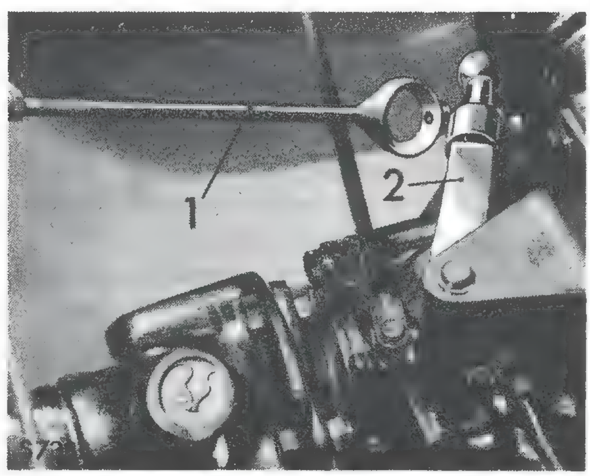
373 FRONT BRAKE CYLINDERS

Refer to Section 37.

374 REAR BRAKE CYLINDERS

Refer to Section 8.

Before disconnecting rods, fully charge air system and, with parking brake released, detach pull rod eye (1) from bell crank lever (2) on rear axle.



After installing cylinder, adjust length of rods as described in Section 153a.

375 REAR BRAKE BISECTORS

The rear bisectors are similar to those used with direct-vacuum servo-assisted brakes and the information contained in Section 9 may be applied except for the brake cylinder removal and installation procedure described under the previous heading.

376 MASTER CYLINDER

Refer to Section 56.

377 LOAD SENSING VALVE

Information concerning the load sensing valve, incorporated in the hydraulic line to the rear brakes, is contained in Section 300. The valve, which is mounted on the automatic trailer coupling, is connected to a spring box on the rear axle by an adjustable linkage.

378 NON-RETURN VALVES

Non-return valves, identical to those described in Section 75, are incorporated in the service and secondary reservoir supply connections and in the parking brake control valve supply line. In addition, a line non-return valve is included in the air line between the compressor and the condensing reservoir. When installing valve, arrow on body must be in direction of condensing reservoir.

379 SAFETY VALVE

Refer to Section 105.

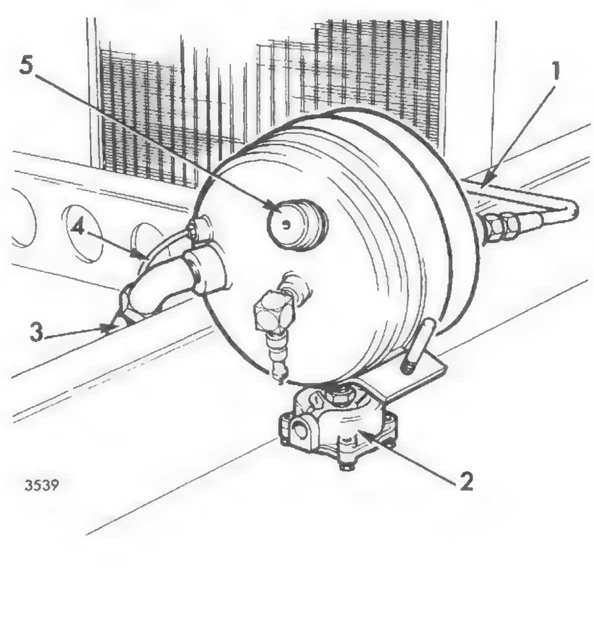
380 STOP LAMP SWITCHES

The stop lamp switches are as described in Section 106 except that they are incorporated in the air lines between the footbrake valve and the master cylinder actuator.

381 CONDENSING RESERVOIR

A condensing reservoir, fed by air from the compressor via a non-return valve and air line (3), is mounted on the chassis sidemember at the front of the vehicle to ensure maximum air cooling and condensation of water vapour.

The reservoir is fitted with an automatic water drain valve (2) and a non-adjustable ball-type safety valve (5). Air line (1) supplies the service and secondary reservoirs and air line (4) the compressor governor valve.



382 AIR RESERVOIRS

The service air reservoir is mounted beneath the secondary air reservoir on a bracket attached to the chassis sidemember immediately behind the cab.

The reservoirs, which are fed with dry air from the condensing reservoir via non-return valves, supply air to the footbrake valve. The service reservoir also supplies the parking brake control valve and trailer emergency air line.

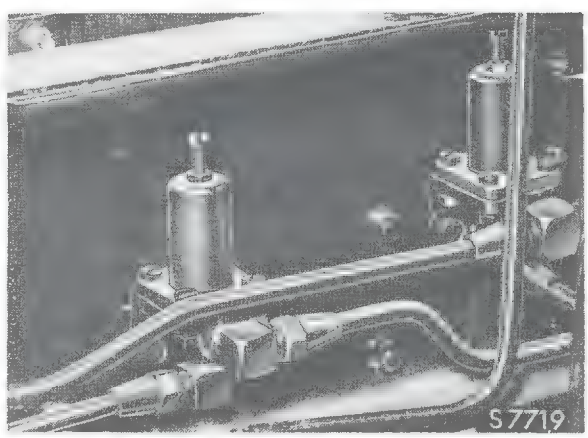
The reservoirs are provided with drain plugs.

383 AUTOMATIC DRAIN VALVE

Refer to Section 110.

384 PRESSURE LOSS LIMITING VALVES

To prevent complete loss of air from the service reservoir in the event of service air leakage in the trailer emergency and/or service air lines, or the parking brake system, a pressure loss limiting valve is incorporated in the system.



The valve consists of a body and cover containing a spring, adjusting screw, diaphragm valve and valve seat.

Compressed air from the service reservoir enters the valve beneath the diaphragm. When the air pressure is sufficient to overcome the spring pressure the valve opens to allow air to pass to the trailer emergency coupling, differential relay valve and parking brake control valve.

384a PRESSURE LOSS LIMITING VALVE – Operating Test

Valve may be checked for operation by fully charging air system and, with engine stopped, applying and releasing parking brake.

When spring brake actuator fails to release, note pressure registered on service reservoir gauge. If cut-out pressure is not within specified limits adjust valve spring tension by means of screw in cover.

384b PRESSURE LOSS LIMITING VALVE – Leakage Test

Valve may be checked for leakage by fully charging air system and smearing body and cover with soap solution. Leakage from cover indicates a faulty diaphragm.

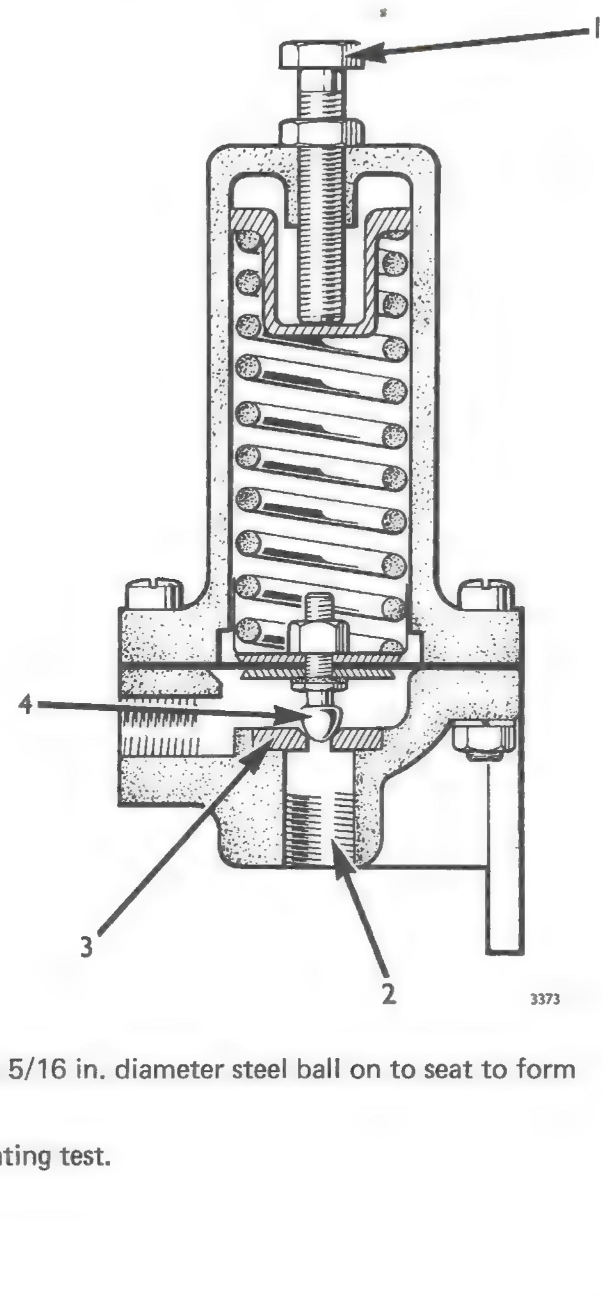
A second pressure loss limiting valve, identical in construction and operation, is incorporated in the system to prevent complete loss of air from the secondary reservoir in the event of servo air leakage in the trailer coupling mechanism.

Operating pressure of valve may be checked on secondary reservoir gauge by noting pressure at which coupling release actuator fails to operate in response to operation of control valve in cab.

When disassembling valve, back off adjusting screw (1) before progressively slackening cover bolts.

Valve seat (3) may be removed by inserting a drift through delivery port (2).

Diaphragm and valve assembly (4) together with valve seat are contained in repair kit.



After pressing valve seat into body, lightly tap a 5/16 in. diameter steel ball on to seat to form an air tight seating for valve.

After installing valve on vehicle, carry out operating test.

385 COMPRESSOR GOVERNOR VALVE

The compressor governor valve is similar to that described in Section 60. The cut-out pressure may be checked on the vehicle dual air pressure gauge.

386 MASTER CYLINDER ACTUATOR

Refer to Section 113.

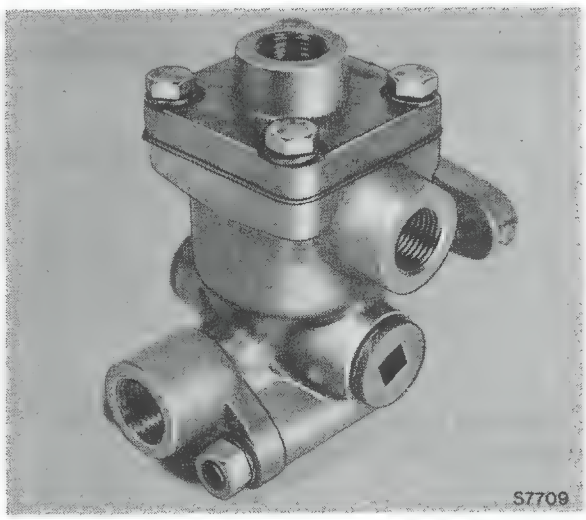
387 RELAY VALVE

A relay valve is incorporated in the secondary brake system to eliminate time lag during application and release of the mechanical trailer brake actuator. Operation and construction of the valve is similar to those described in Section 146.

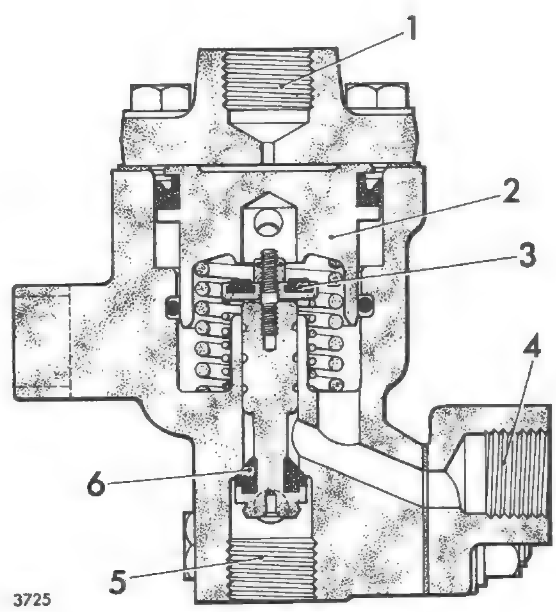
388 DIFFERENTIAL RELAY VALVE

A differential relay valve is incorporated in the trailer service air line on the vehicle to maintain the air pressure to the trailer service coupling approximately 1.0 bar (15 lb/sq in.) greater than the tractor service system during a brake application.

The valve, which is mounted on the chassis sidemember, also provides a direct means of air supply from the service reservoir to the trailer service line coupling.



Air pressure delivered from the footbrake valve enters the signal port (1) in the valve cover causing the piston (2) to move down until the exhaust seat closes against the exhaust valve (3). Further movement causes the inlet valve (6) to move off its seat allowing air direct from the reservoir to enter the valve through the supply port (5) and exit from the delivery port (4) to the trailer service coupling. The pressure supplied to the trailer service air line also reacts on the underside of the piston causing it to rise until the inlet valve closes. In this condition, although the valve is in a balanced state, the pressure acting on the top of the piston is less than the pressure acting on the underside of the piston due to the difference in area. The valve therefore delivers approximately 1.0 bar (15 lb/sq in.) more pressure to the trailer service coupling than the footbrake valve delivers to the tractor service system until the trailer coupling receives reservoir pressure. After this point, only the tractor service pressure can increase.



388a DIFFERENTIAL RELAY VALVE – Operating Test

To test for correct operation of valve connect an air supply of constant pressure to supply port together with an air pressure gauge. Connect a variable air supply and gauge to signal port in cover and a separate gauge to delivery port.

Slowly increase signal pressure and check that delivery pressure is approximately 1.0 bar (15 lb/sq in.) greater than signal pressure until delivery pressure equals supply pressure. After this point, only signal pressure should increase.

388b DIFFERENTIAL RELAY VALVE – Leakage Test

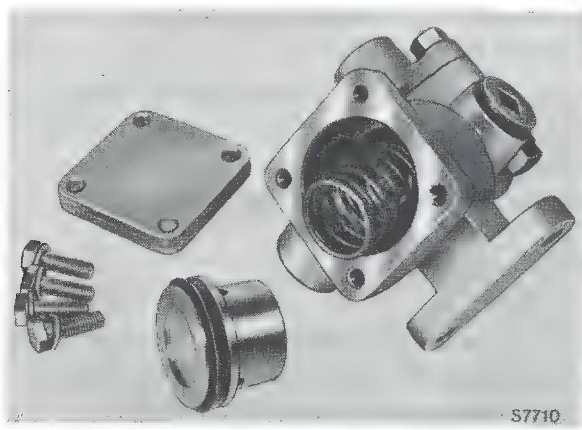
Valve may be checked for leakage by fully charging air system and, with footbrake applied, smearing exhaust port with soap solution. Leakage in excess of a ½in. bubble in five seconds is not permissible.

Release footbrake and again check for leakage from exhaust port. Leakage in excess of a ½ in. soap bubble in ten seconds is not permissible.

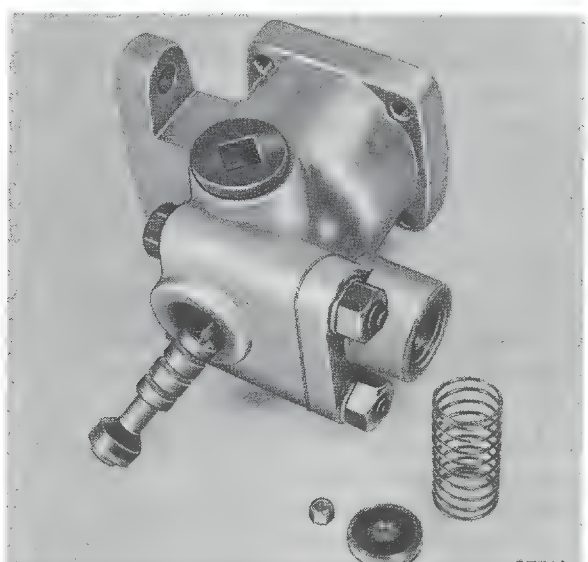
Leakage from joints and connections is not permissible.

388c DIFFERENTIAL RELAY VALVE – Disassembly

Piston and spring may be withdrawn after removal of valve cover.



Inlet valve and stem can be withdrawn through supply port after removal of nut securing exhaust valve.



Discard all components which will be renewed from a repair kit.

388d DIFFERENTIAL RELAY VALVE – Inspection

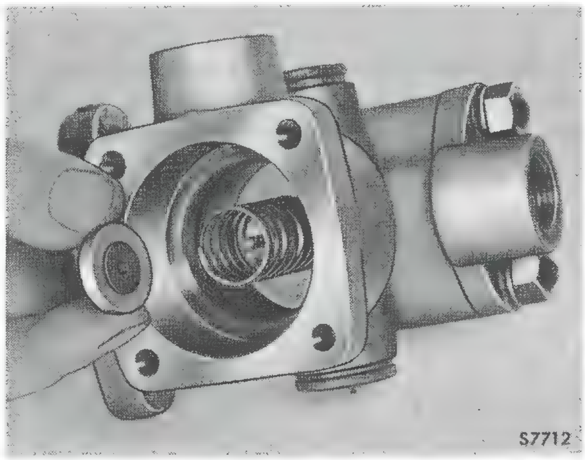
Examine sliding surfaces of piston and stem, and bores in body for excessive wear or scores.

Check springs for signs of corrosion.

388e DIFFERENTIAL RELAY VALVE – Reassembly

Before reassembly smear all sliding surfaces and seals with recommended grease.

After inserting inlet valve and stem through supply port, secure exhaust valve with metal side in contact with spring. A gasket is used between exhaust valve and plunger.



Before inserting piston and spring, place sealing ring in groove in body and ensure open side of piston seal faces towards larger end of piston.

Before installing valve, carry out operating and leakage tests.

389 ANTI-COMPOUND VALVE

The anti-compound valve is similar to that described in Section 147 except that the trailer secondary coupling consists of an actuator which operates the mechanical brakes on the trailer.

389a ANTI-COMPOUND VALVE – Operating Test

Before carrying out operating test, disconnect flexible hose from service-park coupling head. To check operation of valve, fully charge air system and apply footbrake.

Trailer mechanical brake actuator should not operate.

Exhaust air from service reservoir by means of drain plug and from condensing reservoir by depressing wire in exhaust port of automatic drain valve. With footbrake applied, check that mechanical trailer brake actuator operates.

390 FOOTBRAKE VALVE

The footbrake valve is similar to that described in Section 114 except that the valve also controls the service air line to the trailer and the mechanical trailer brake actuator.

391 COMPRESSOR CYLINDER HEAD

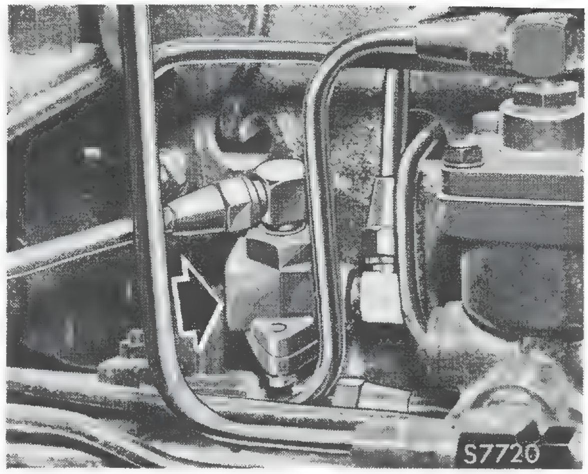
Refer to Section 115.

392 COMPRESSOR

Refer to Section 116.

393 CHANGE-OVER VALVES

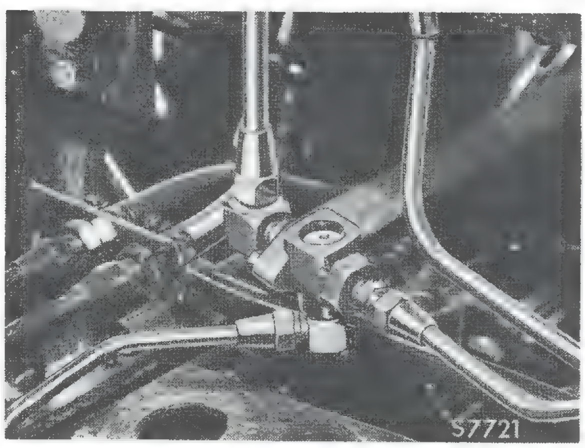
A change-over valve is incorporated in the system to prevent compound application of the rear brakes by means of the spring brake actuator and the hydraulic system.



The operation and construction of the change-over valve is as described in Section E except that when the parking brake is released the valve prevents leakage through the footbrake valve.

Leakage at footbrake valve port of change-over valve may be detected by fully charging system and smearing exhaust diaphragm at rear of footbrake valve with soap solution. Leakage in excess of a ½ in. bubble in five seconds, with parking brake valve in 'OFF' position indicates a faulty shuttle valve.

A change-over valve is also incorporated in the air line to the mechanical trailer brake actuator. This enables the tractor service system to operate the trailer mechanical brakes when a trailer without an air brake system is used with the vehicle.



When a trailer having an air brake system is used with the vehicle, the change-over valve prevents air leakage through the service-park coupling head.

When a trailer without an air brake system is used with the vehicle, the service line flexible hose must be connected to the service-park coupling head and the change-over valve prevents air leakage through the anti-compound valve.

Change-over valve may be checked for leakage by fully charging air system and smearing service-park coupling head with soap solution. Exhaust air from service reservoir by means of drain plug and from condensing reservoir by depressing wire in exhaust port of automatic drain valve. With footbrake applied, leakage from coupling in excess of a ½ in. bubble in five seconds indicates a faulty shuttle valve.

With service line flexible hose connected to service-park coupling head and system fully charged, disconnect air line from anti-compound valve side of change-over valve. Smear change-over valve port with soap solution and check for leakage with footbrake applied. Leakage in excess of a ½ in. bubble in five seconds indicates a faulty shuttle valve.

394 PARKING BRAKE LINKAGE

Refer to Section 153.

395 PARKING BRAKE CONTROL VALVE

Refer to Sections 87 and 88.

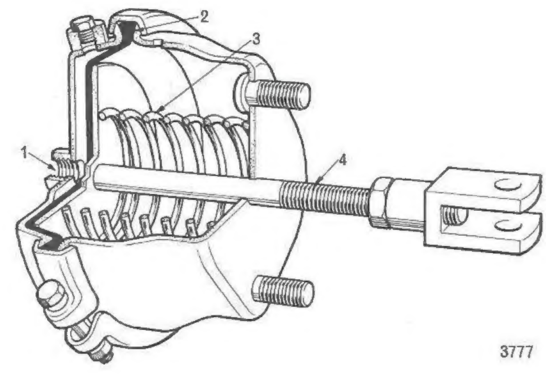
396 SPRING BRAKE ACTUATOR

The spring brake actuator is similar to that described in Sections 89 and 90 except that it is mounted on a support bolted to the chassis crossmember.

397 MECHANICAL TRAILER BRAKE ACTUATOR

The mechanical trailer brake actuator, mounted on the tractor coupling, is of the 'pusher' type with an adjustable push rod extending through the actuator body.

When the footbrake is applied, with the service line connecting hose attached to the service-park coupling head, air enters the inlet port (1) behind the diaphragm (2) which, together with the push rod (4) moves against the return spring (3) to operate the trailer brakes.



397a MECHANICAL TRAILER BRAKE ACTUATOR – Leakage Test

Actuator may be checked for leakage by fully charging air system and attaching service line connecting hose to service-park coupling head. With footbrake applied smear vents in actuator body with soap solution. Leakage indicates a faulty diaphragm.

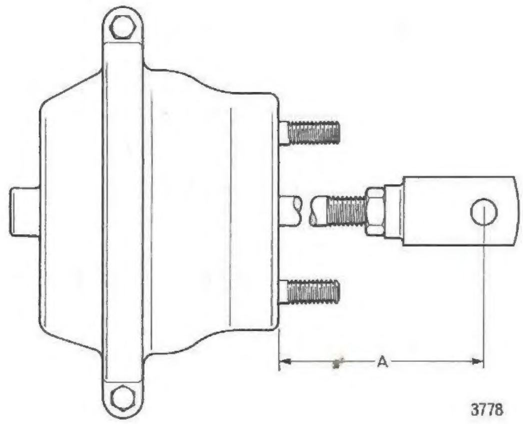
397b MECHANICAL TRAILER BRAKE ACTUATOR – Disassembly

Before removing clamp, mark position of body and cover in relation to clamp to ensure correct reassembly. Spring tension may be overcome by hand pressure.

397c MECHANICAL TRAILER BRAKE ACTUATOR – Reassembly

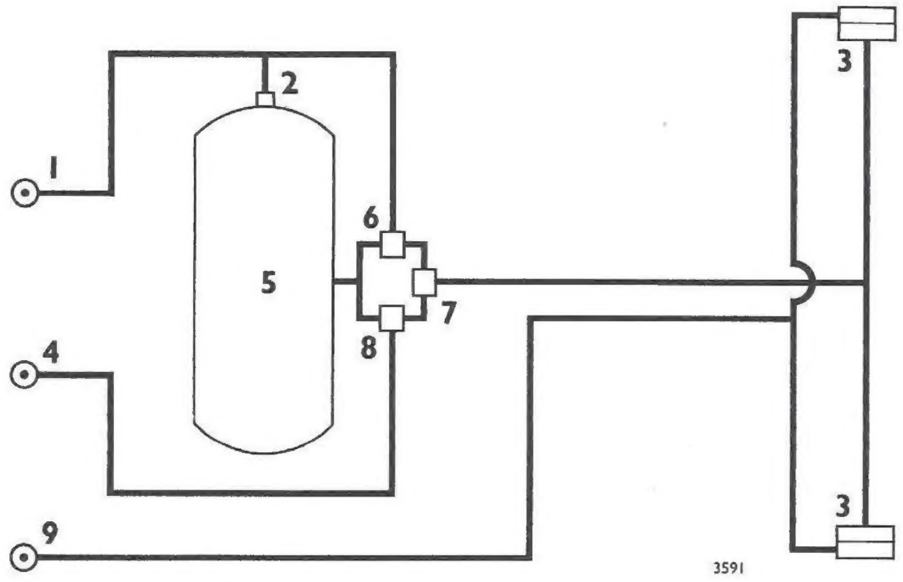
When assembling actuator, tighten clamp bolts evenly and re-check after diaphragm has been allowed to settle.

Before securing push rod clevis with locknut, ensure that dimension 'A' between actuator attaching face and centre of clevis pin hole is 5.00 in.



3778

TRAILER AIR BRAKE SYSTEMS



Many trailer air brake systems are in use and it is beyond the scope of this publication to adequately cover all variations. The information contained in this section applies to a typical trailer brake system used in conjunction with Bedford tractors.

The trailer is provided with a reservoir (5) supplied with compressed air from a reservoir on the tractor via the red flexible emergency line connecting hose (1) and non-return valve (2). The trailer reservoir supplies air to the trailer brake actuators (3) through a control valve normally attached to the reservoir.

The control valve may be regarded as a combination of a relay valve (8), anti-compound valve (6) and a change-over valve (7). The relay valve controls the trailer service line and is itself controlled by air pressure from the tractor service line (4), which is provided with a yellow flexible connecting hose. The anti-compound valve also controls the trailer service line but is normally prevented from delivering air pressure by the action of the emergency line air pressure connected to it.

In the event of the emergency line pressure being lost, the anti-compound valve delivers compressed air from the trailer reservoir to the trailer brake actuators to apply the brakes. This also occurs when the emergency line is uncoupled from the trailer, and the brakes are held on until either the emergency line air pressure is restored or the trailer reservoir pressure released by means of the drain tap.

When a trailer having a two-line brake system i.e. service and emergency, is used, the blue secondary line flexible hose on the tractor must be connected to the secondary-park coupling head on the tractor. This enables the tractor secondary system to operate through the yellow service line flexible hose in the event of failure of the tractor service system.

A three-line trailer brake system consists of a two-line system with the addition of a secondary air line (9). This air line, which is supplied with compressed air from a tractor reservoir via the blue flexible connecting hose, is connected directly to the trailer brake actuators and provides a means of applying the brakes in the event of failure of the tractor service system. In this case the trailer brake actuators are of the dual type.

Operation of the secondary brake system on a three-line trailer coupled to an EJQ, EPR or ERT tractor can only be checked by fully charging the air system and then exhausting the trailer reservoir by means of the drain tap. In this condition only the trailer secondary brake and tractor brakes will be applied by operation of the footbrake pedal.

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